NOV. 14 1958

PETROLEUM WEEK

A McGRAW-HILL PUBLICATION

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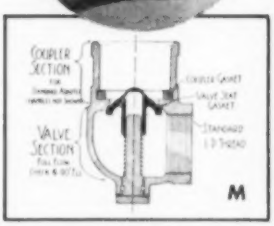

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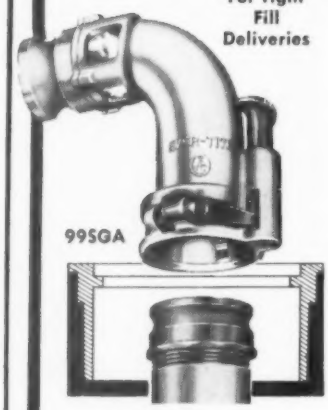

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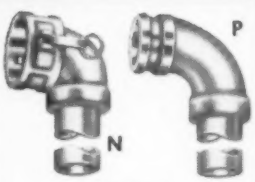

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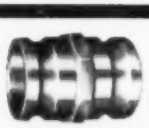

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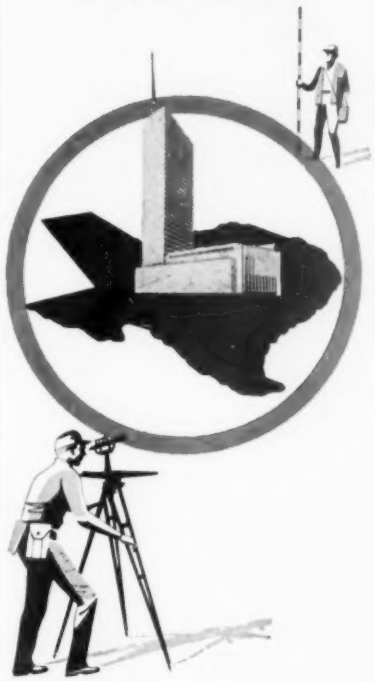

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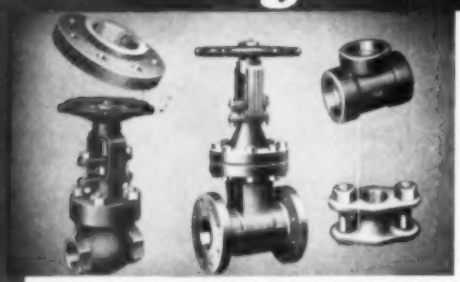

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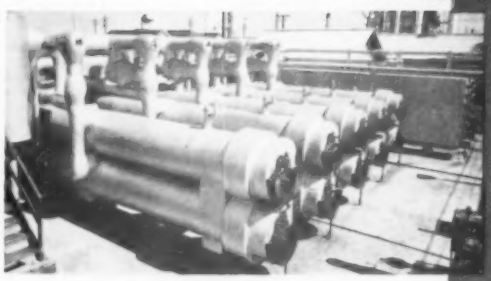

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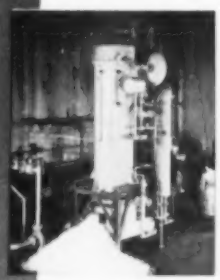

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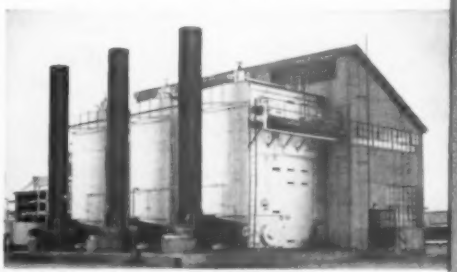

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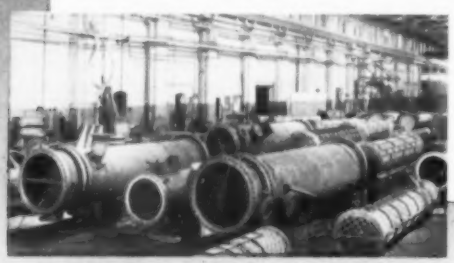

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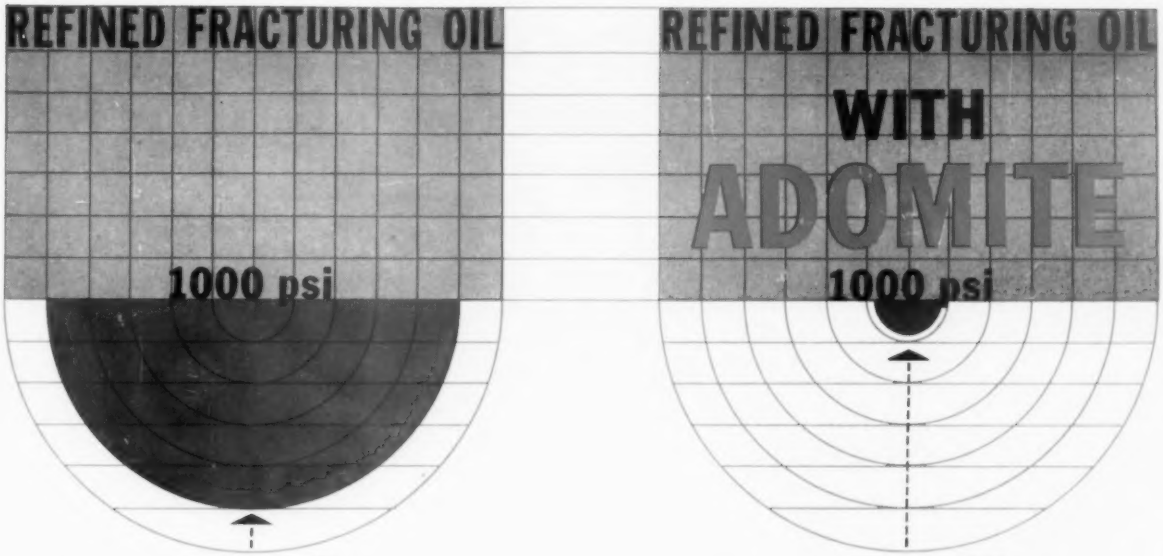

250 CC fluid loss in 2 minutes*

40.5 CC fluid loss in 30 minutes*

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you DO need an additive for fluid loss control

At the higher pressures so often necessary in fracturing, Adomite is needed to control fluid loss to get the greatest fracture area possible. For instance, when using refined fracturing oil *without* Adomite, the fluid loss at 1000 psi is 250 cc in just 2 minutes. Imagine what it would be over a greater period of time. The chart shows the decided difference Adomite makes in the effectiveness of fracturing fluids. Fluid loss is cut to a minimum.

Adomite works by temporarily sealing the pores of the rock matrix. Adomite not only retains its stability under extreme pressures but also under the highest temperatures. With this better stimulation technique, you can fracture larger areas and reach untapped resources. Adomite leaves no permanent seal on the fracture wall or any evidence that the formation had ever been sealed . . . because it permits lower viscosity with lease crudes, greater injection rates can be attained.

For your next fracture or refracture job, you can be sure of better results by using Adomite to minimize fluid loss. Specify Adomite through your service company.

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Crude Oil + Adomite	8.8	19.6
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For more information, contact one of the individuals in your area . . .

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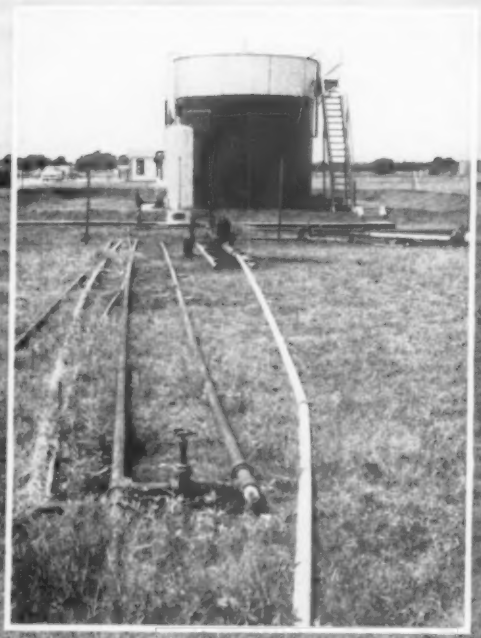

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...longer service lines, installed faster

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. . . That's more than $50,000 per year on 30 jobs, by reaching out farther for low cost gas . . .

The lightweight strength and flexibility of Reynolds Aluminum Oil Country Pipe is really saving money for one Houston drilling contractor—$1700 per well, or more than $50,000 per year!

Oil Production Maintenance, Inc., operating seven power rigs, uses Reynolds Aluminum Pipe for rig service, for both water and gas. Because the lightweight, corrosion-resistant aluminum pipe can be installed so quickly, and so economically, Oil Production can reach out farther, for low cost gas. The fuel savings resulting amount to $50,000 a year on an average of 30 jobs per year.

One of the Reynolds Aluminum Pipe service lines used by this driller is *9½ miles long*. That's more than twice as long as the longest economically-feasible steel pipe line used by this company.

INSTALLATION SAVINGS

Oil Production Maintenance reports that two men can lay a mile of the lightweight aluminum pipe in just two hours. Two men can pick up a mile of aluminum pipe in one hour. This is about ten times faster than laying the same size steel pipe.

The chief reason for this speed is, of course, the light weight of aluminum pipe. But it is also a fact that aluminum pipe is easy to couple, and flexible, so that it follows ground contours readily.

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If it's a Cameron Flex-Seal Mud Valve, you'll find The Biggest Reserve of Rubber in Any Mud Valve. The seat packer of tough but resilient Hycar synthetic rubber is what makes a mud valve a mud valve. But to eliminate frequent repair there must be plenty of reserve rubber to take the beating that high pressure, pulsating abrasives will give a valve in mud line service. Ask anyone who has made a comparison – you will find that Cameron Flex-Seals have many times the reserve rubber of other mud valves. You will find, too, that they not only have the longest wear, but they are also easier to repair. Of course more operators COUNT ON CAMERON Flex-Seal Mud Valves.

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THE BIGGEST RESERVE OF RUBBER IN ANY MUD VALVE

60-Second Summary

WHAT'S HAPPENING IN OIL

November 14, 1958

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Sale of producing properties by independents is increasing, and will gain more momentum if inflation grows. Many independents find the payout is too slow when they produce the properties themselves. Meanwhile, the larger companies are looking for inventories in the ground as a hedge against inflation. . . . p. 19

•

The potential for petroleum in the years ahead is staggering. Consider this: A free world demand of 37.2-million b/d by 1975, an increase of 134% over 1957. In some areas, such as Western Europe, the increase may be as much as 230%. . . . p. 22

•

The upswing in industrial production means a stronger demand for heavy fuel oil. But, long-range, it may bring higher price tags on the goods oil uses. . . . p. 46

•

The biggest research emphasis in '59 will be in processing: Getting the maximum value from each barrel of crude. But a Petroleum Week Special Report also shows growing efforts to find cheaper ways to discover and produce crude. . . . p. 56

•

Look for a big gas play in the Alberta foothills—when the export muddle clears. Most observers are sure the potential is there, but large scale development probably will not be undertaken until a market becomes more certain. . . . p. 28

•

Jobbers are still split over whether to "go to the government" about supplier practices. Some feel that legislative or court action is the only answer to the red hot commercial accounts issue. Others find this approach distasteful. . . . p. 24

•

Don't overlook developments in oil transportation. Improvements are being made all along the line: tankers, barges, rail cars, tank trucks, and pipelines. . . . p. 94

•

A reclamation shop can pay dividends in time and cost savings. Socal finds that such work is especially useful in reducing refinery downtime and maintenance. . . . p. 49

•

Consider this: If Middle East oil terms get tougher, the price of crude from that area will go higher. This would make Mideast crude harder to market, particularly in the Eastern Hemisphere where Russian crude exports on special terms provide a growing threat. . . . p. 104

•

Watch for more Russian moves in Latin American oil countries. The new $100-million oil equipment deal with Argentina is likely to be just a beginning. . . . p. 23

Up to the Minute / SIGNIFICANT LATE NEWS

AT-A-GLANCE PETROLEUM WEEK Copyright

November 14, 1958

The U.S. now has a crude productive capacity of about 10-million b/d, or 3-million b/d above current production. Furthermore, it could sustain this increased rate for many years if the industry continues an aggressive program of exploration and development. These points were stressed by Morgan J. Davis, Humble's president, at Wednesday's API meeting, as a reply to skeptics who questioned this nation's crude productive capacity.

•

Many producers in Utah's Aneth area are willing to sell gas now and argue price later so they can resume production. After Interior Dept.'s gas flaring shutdown order became effective Monday, they asked Federal Power Commission for temporary certificates to sell to El Paso Natural without waiting for approval of contract rates, opposed in California.

•

A top posting of $3.08 a bbl. may become the "happy medium" price for Oklahoma sweet crude, after several weeks of confusion with top postings ranging from $2.81 to $3.15. Sunray Mid-Continent, the largest buyer which initially trimmed postings from 14¢ to 31¢, this week restored 7¢ to its schedule, meeting the top posting of Indiana Oil Purchasing, Continental, and Phillips. Gravity differentials may be harder to settle.

•

The Supreme Court will hear arguments over whether FPC should specify initial gas rates. The court has accepted an appeal by Oklahoma Natural Gas Co., which is protesting a Federal Power Commission refusal to reduce the price Natural Gas Pipeline Co. of America had agreed to pay producers in Jack and Wise Counties, Tex. Oklahoma Natural's objection: The new rate would create an upward spiral of existing prices.

•

L. E. Fitzjarrald, Clarence H. Thayer, C. J. Guzzo, and W. J. Arnold are the new API vice-presidents. Fitzjarrald, manager of production, Phillips Petroleum, will head the production division, Thayer, Sun Oil vice-president, will head refining activities; Guzzo, Gulf Oil vice-president, will direct marketing; and Arnold, assistant vice-president, Pure Oil, will head up finance and accounting.

•

Argentine President Arturo Frondizi took drastic steps this week to uphold his oil development policy. He declared a state of siege to quell what he termed Communist-inspired opposition to oil contracts with foreign firms. Meanwhile, the government extended for 30 days the November 12 deadline for concluding an agreement on the Atlas Corp. group's oil proposals.

•

Cheap foreign flag tanker rates may work in favor of West Coast refiners loaded with residual. Two cargoes of California "C" fuel are slated to go to Sweden—one prompt, and one later. Others may follow.

Assures control of paraffin viscosity

EPOLENE "N"

Viscosity control of paraffin formulations calling for the addition of polyethylene is assured—if Epolene "N", Eastman polyethylene wax, is used. Because uniformity of coating paraffins is so important, Eastman takes special care to produce Epolene between narrow limits of viscosity.

Published specifications for the viscosity of Epolene "N" are within the range of 2200 and 2700 cps at 125° C—your assurance of close control and uniformity from batch to batch.

The table shows what this uniformity means in polyethylene-based paraffin formulations. Five percent samples of Epolene "N", from the *extremes* of our production range, were mixed with paraffin—and the viscosities of the resulting mixtures were taken on the same Brookfield Viscometer.

Sample	Viscosity at 200° F (cps)
100% paraffin	4.8
95% paraffin—5% Epolene "N" (2250 cps)	7.5
95% paraffin—5% Epolene "N" (2700 cps)	7.6

Although viscosity varies from paraffin to paraffin, these results dramatize the advantage of using Epolene "N". Thus, for the paraffin under test, the maximum variation encountered in the final viscosity of the 5% Epolene blend was only 0.1 centipoise.

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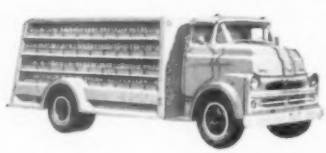

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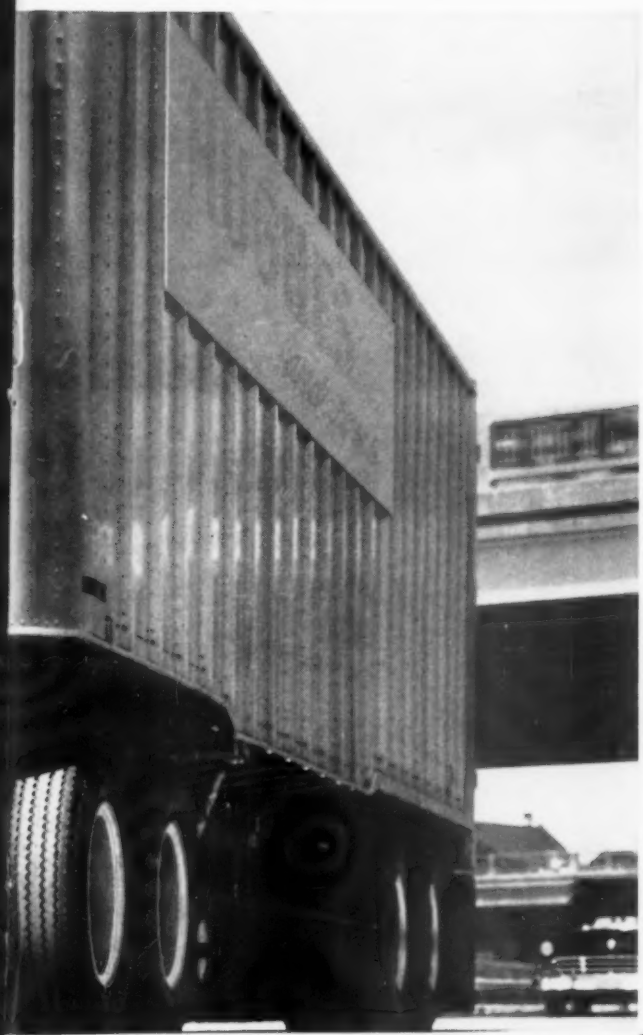

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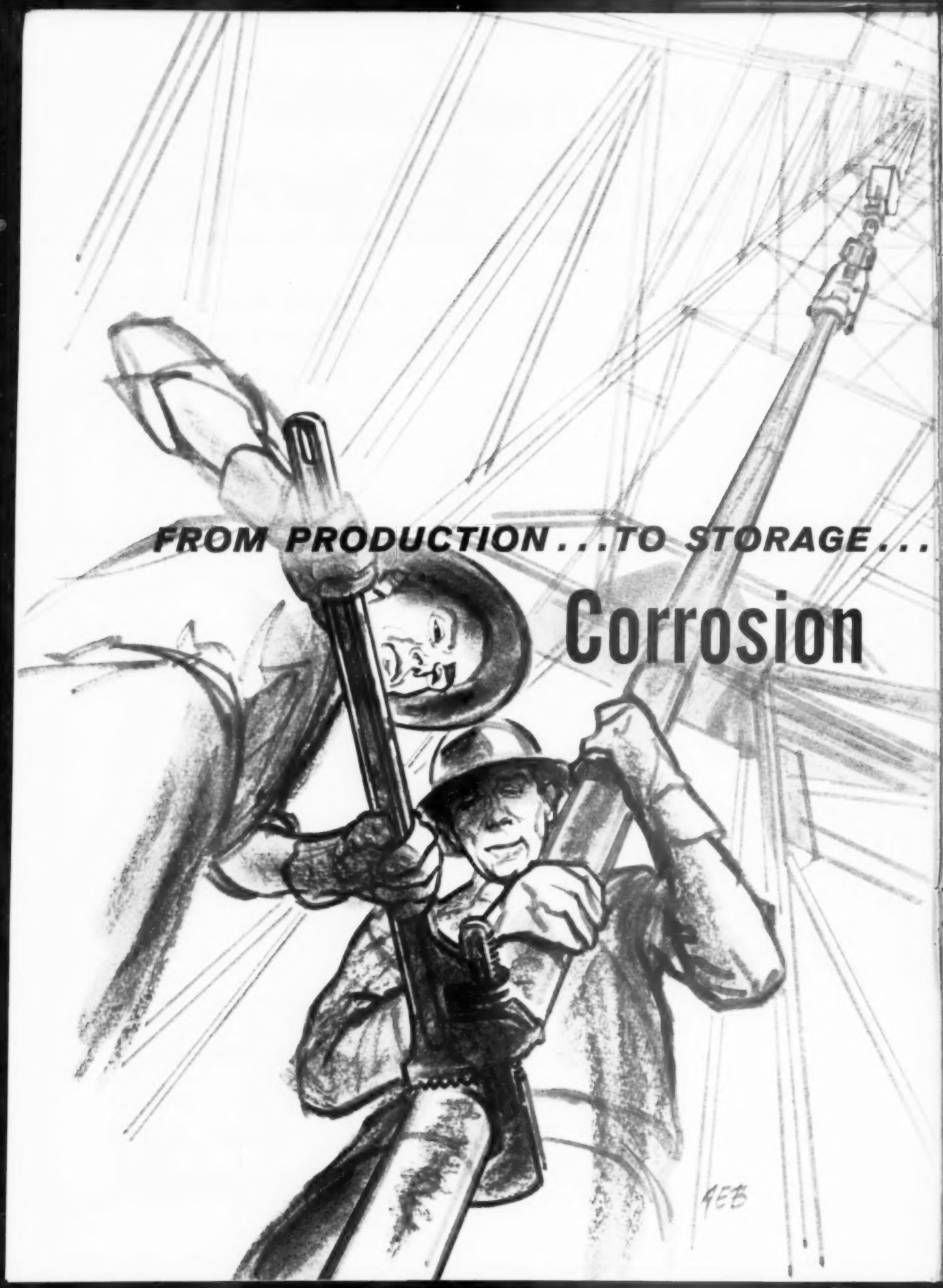
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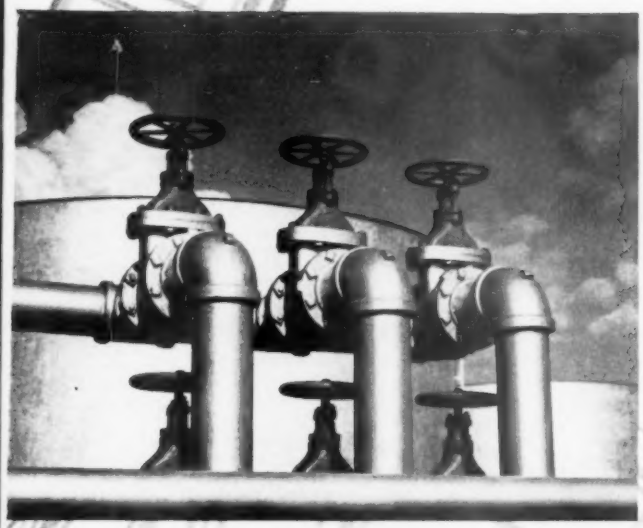

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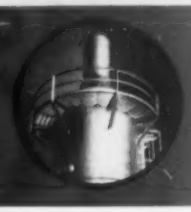

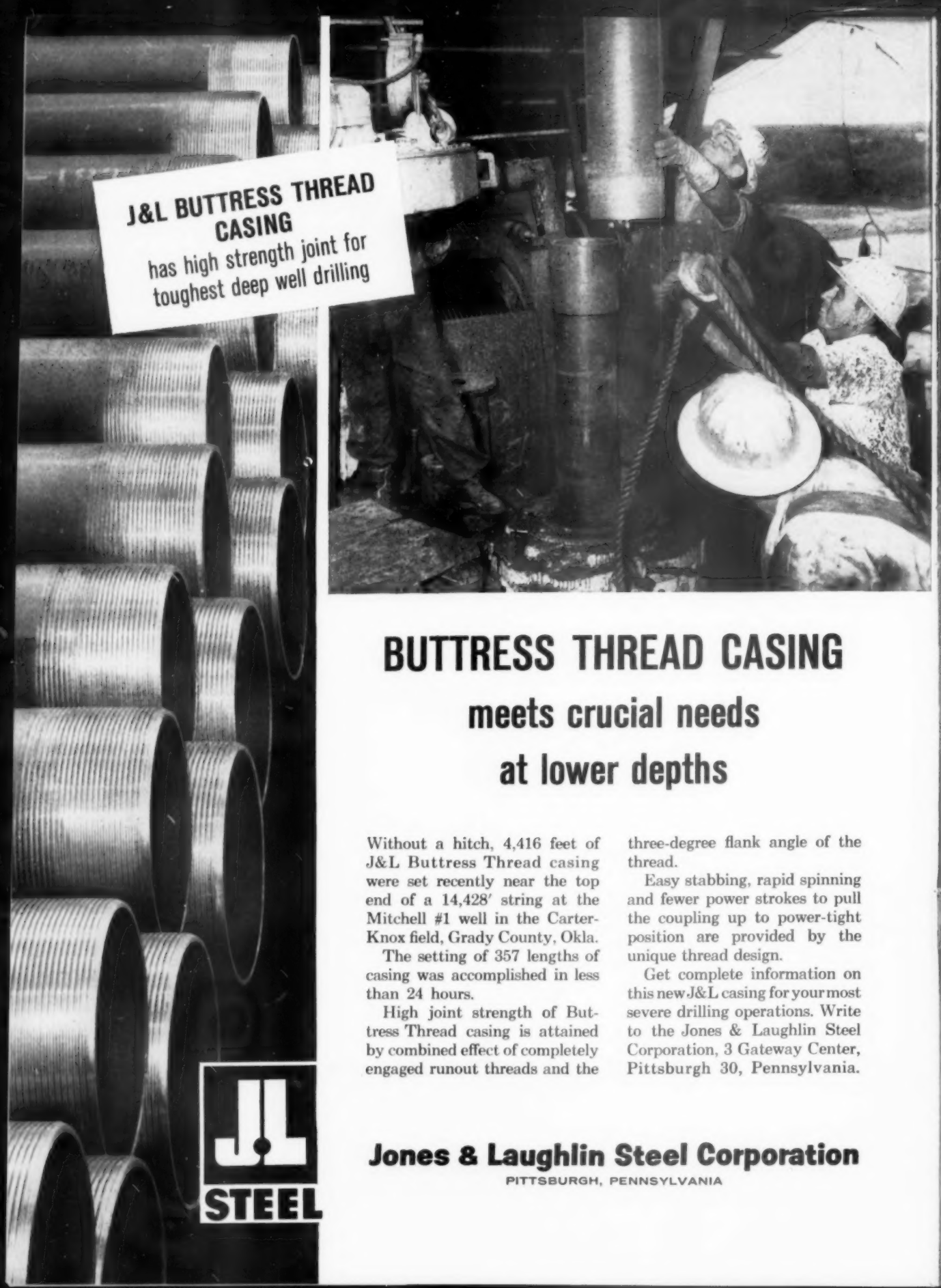

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Sales of Oil Reserves Turn Upward

The squeeze of rising costs, low prices, and tight allowables makes sales of producing properties more attractive, especially by small independents.

Any inflationary trend will carry with it an increase in sales of producing properties by independents.

That's the prediction of numerous oil bankers interviewed by PETROLEUM WEEK this week—those attending the API annual meeting, and others across the country.

Nearly all of the bankers agree that the nation is headed for an inflationary period—but not necessarily a runaway inflation.

In such periods, the offers for producing properties will become more attractive, with a greater number of sales—particularly sales of small producing properties.

Says one Midwest banker: "Larger companies will be looking for inventory in the ground. And since oil in the ground is a self-liquidating asset, it becomes more valuable during an inflationary period."

A rise in sales of producing properties will mean a change in the operating climate of independents.

They are not going to be wiped out, one leading banker observes, but they will be operating on a different scale.

Rushton Audrey, of Dallas's Republic National Bank, surprised many independents—and even some bankers—with his statement at the recent annual meeting of the Independent Petroleum Assn. of America that 80% of his bank's oil loans now go toward financing the purchase of properties (PW—Oct.31'58,p8).

This represents a reversal of the previous trend, when nearly all of the oil loans by banks in the Southwest went for development of properties.

Other bankers report a similar trend, though not such a high ratio of "purchase" loans to development loans.

Eugene McElvaney, of the First National Bank in Dallas, predicts that "the trend will be with us for some time."

And while Republic Bank's Audrey notes that the "heydey" of the independent may be over, he emphasizes that the independent "is not out of business. We look for demand to catch up with supply, bringing higher allowables."

A survey of buyers of Texas oil confirms that prediction. Their estimates of producing days in Texas for 1959 range from 125 to 146, compared with a probable 122 this year.

One major company estimates that, during the winter months, Texas will be on a schedule of 12 days per month, slightly above last winter, but two days under the average for the 1956-57 winter.

Selling producing properties may benefit the nation's oil reserve position, since much of the proceeds from such sales is being plowed back into new ventures.

It's difficult to estimate now just how much of the property-sale money is being spent on new drilling.

But the experience of Houston's Bank of the Southwest provides one clue that such revenues find their way back into the search for oil.

"Our production loans right now are gradually climbing," says Harold Vance. "Sales of properties knock them down occasionally—an operator sells properties, pays off his outstanding loan. But then he frequently comes back for another loan to develop a new property."

Kline McGee, of the Texas National Bank, in Houston, notes another feature of rising purchase loans. Following a substantial loan to purchase a property, the buyer may come back for another loan to develop the newly acquired property.

The reason behind sales of producing properties is economic. Frequently it's "better business" to sell a property than to continue to produce it.

Many bankers cite the rise in im-

SEEN AT API BY A PETROLEUM WEEK CAMERA

A Busy Place

As usual, the annual API meeting in Chicago was the setting for serious talk about oil problems, and for small talk between old friends.

The pictures on this page—and on the next five—are of some of the industry leaders who attended the meeting.

GREETINGS: Ernest O. Thompson, left, Texas Railroad Commission, and Frank Porter, API president, exchange warm hellos.

SIGNING IN: John W. de Groat, Tuscarora Pipe Line Co., Ltd., Harrisburg, Pa.

ports as the primary cause for sales. The availability of foreign oil has brought considerable pressure on producing rates and prices paid for domestic crude.

The over-all result is a squeeze on the ability of producers—particularly the nonintegrated independent—to retire debt.

And as one leading Southwest banker observes: "We have not curtailed our lending terms. We are actively looking for new oil loan business, but we just don't have the demand for loans from independents."

The Bank of the Southwest's Vance says: "It's amazing what some of our customers are doing. They've learned to tighten their belts and operate more economically."

The squeeze caused by the combination of low allowables and reduced prices for crude means that:

Selling producing properties and paying a capital gains tax often will result in about the same income that would be realized from producing the properties over a long period.

The price structure for domestic crude is relatively lower than other commodities, as shown by the commodity index, the bankers note.

"The true yardstick for the worth of a barrel of oil is what it cost to find it," according to McElvaney.

"Figured on the same cost basis as steel," he adds, "oil would be selling for $4 a bbl."

The biggest influence on the buyers of producing properties is the continued rise in oil-finding costs.

"One of my customers has reached the conclusion that he can buy one producing property per year and increase his reserves more economically than by going out and drilling," says one oil banker.

"Leasing, shooting, and drilling is just too expensive—and risky, the client found."

Another bank cites as an example a recent producing property purchase that amounted to about $100-million.

"Based entirely on known reserves as of now," he says, "the purchase will only yield about a 5¼% return. But considering that the cost of finding oil has more than doubled in the past ten years, that purchase might turn out to be a bargain, even if additional drilling doesn't increase the reserves."

In another instance, a Southwest bank financed the purchase of a property for $5-million back when the Texas allowable was 18 days.

"Now, with the allowable down to 11 and 12 days," the lender reports, "a major company wants to buy the property for $5.5-million—with a 25-year payout. Meanwhile, our customer had the benefit of production from that property for several years."

Porter: Oil Must Unite, Fight

API President Frank M. Porter this week called on oil men individually and the industry generally to stand up and answer oil's critics "boldly, factually, and fearlessly."

It's the best method for protecting "our own reputation and the reputation of the industry that employs us," he said in his annual message to the API meeting.

Only a truly unified industry, Porter said, can win against the odds and adversaries oil now faces. "We must not let our private differences become public disputes," he warned. "We must not manufacture ammunition for our enemies to shoot."

"We have the facts, we have the cause, and we have the manpower if we will only put it to use, appeal to it, direct it, and recognize . . . [there is] a battle for our freedom," Porter argued.

"Our critics are not sparring, they are slugging," he charged. "They cannot be driven off with faint-hearted, half-hearted, spasmodic efforts. If we are to win, we must throw ourselves into the struggle, giving our knowledge, our experience, and our talent to the fray that will decide with finality the career of every man and woman [in the industry]."

Political participation by oil companies will help the industry, Porter commented at a press conference prior to his annual address in Chicago.

Answering a question on the merits of the recent move of Gulf Oil Corp. to actively enter politics as a corporate citizen, Porter said: "I think Gulf is being realistic about it. I think the trend is on."

- **On percentage depletion, Porter noted that the industry will have to face Congressional study sometime next year.**

"We are looking forward to hearings" on the retention of the present percentage depletion provision, he said.

- **On prices, Porter said the future is difficult to predict, but lower prices will have "an adverse effect on development."**

The "whittling away" at crude prices and "erosion" of product prices are certainly cutting into the income of producers, he said.

SEEN AT API BY A PETROLEUM WEEK CAMERA

EARLY: W. D. Wilson, Wilson Supply Co., Houston, and A. W. McKinney, National Supply Co., Pittsburgh.

GOOD TO SEE YOU: George Goad, left, Tidewater Oil Co., San Francisco, and Fred M. Trawek, crude marketer, Houston.

NICE DAY: W. B. Klaus, Tidewater, San Francisco; M. B. Henry, Richfield Oil Corp., Los Angeles.

At API: Vigorous Views Are Voiced

"One of the problems in America is the use of economic organizations for political purposes. Politically, we should express ourselves as individual citizens . . . not as members of different economic groups . . . It will be tragic and probably fatal to American freedom if big business corporations follow the union trail to politics."

—George Romney, president, American Motors Corp.

•

"My personal belief is in the prime importance of protecting the public interest by promotion of natural healthy competition as far better and more effective than any system of artificial restraints on freedom of action."

Sam S. Burchmore,
general counsel National Industrial Traffic League

•

"The costs of producing oil and gas cannot be divided by means of identification with either oil or gas, but it is necessary to proceed on the assumption that the courts have held such costs must be divided and the cost of gas determined for regulatory purposes."

—Stanley P. Porter, Arthur Young & Co.

•

"Let each integrated supplier limit production, refinery runs, and yields to his company's marketing potential—and the market will return to some semblance of stability."

—Miles M. Mills, National Oil Jobbers Council

•

"Surely our common goals in serving the American people outweigh any internal differences. We must maintain a strong and healthy domestic oil industry, and at the same time we must look forward to the day when this country will be more and more dependent upon crude oil from foreign sources."

—W. S. S. Rodgers, former chairman, The Texas Co.

"The refining industry has at the present time adequate flexibility in physical facilities to meet any foreseeable variations in product demand. It only remains for refiners to use this flexibility."

—H. W. Ferguson, vice president, Humble Oil & Refining Co.

•

"We have been accused of having the biggest lobby in the world, but we found out we didn't. If we find we have to, however, we will have the biggest lobby."

—H. S. M. Burns, chairman, American Petroleum Institute

•

"The chief obstacle to our success (in reducing costs) is likely to be not in our lack of skill but in our lack of will. I am fully convinced that if we do not find the means of reducing the cost of domestic oil, this industry may seek increasingly various kinds of government assistance and will forever regret a stifling blanket of federal controls."

—L. F. McCollum, president, Continental Oil Co.

•

"In the face of tensions between nations the cooperation in science is a bright hope, and work is now being planned to ensure that the best parts of the international cooperations started in the Geophysical Year can be continued. Understanding in science . . . is best achieved when people sit face to face and discuss problems."

—Athelson Spilhaus, dean, University of Minnesota

•

"At Sun, we attempt to foresee the general level of economic activity and of broad industry components for about five years in advance. To forecast for a shorter period means that many of today's plans would unfold in a climate that we had not adequately contemplated; to forecast for a greater period is apt to carry us into pure conjecture."

—Robert G. Dunlop, president, Sun Oil Co.

SOME CHARM: Mr. and Mrs. H. G. Williams, left, Rock Island Refining Co., Wichita, and George Martin, Rock Island, Duncan, Okla.

SOUTHWESTERNER: R. M. Chan, Transwestern Pipe Line Co., Dallas.

MORE TALK: E. J. Henry Jr., left, Atlantic Refining Co., Dallas, and W. C. Rhodes, Sinclair Crude Oil Co., Tulsa.

Free World Demand Will Rise Sharply

The long-term trend of demand growth will require a "huge development" of crude production, and expansion of transportation, refining, and marketing facilities.

That's the prediction of Austin Cadle, manager of the economics department of Standard Oil Co. of California, made at the API annual meeting this week.

It is based on the anticipated trend of free-world demand between now and 1975, which shows that:

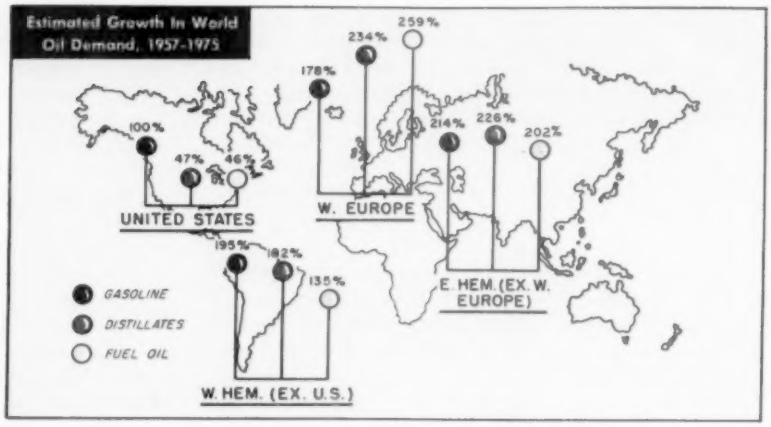
- Demand has by no means reached a saturation point in the U.S.;
- The future pattern of petroleum consumption in the undeveloped areas of both hemispheres is one of "astounding" expansion; and
- Western Europe, in particular, shows great potentialities, especially for growth in demand for distillates and residual fuel.

By 1975, free-world demand for all petroleum is expected to rise to 37.2-million b/d, constituting half of total energy needs.

The increase in petroleum demand over 1957 will amount to 134%, Cadle predicted. The over-all gain will be made up of increases of 229% in Western Europe, 214% in other parts of the Eastern Hemisphere, 76% in the U.S., and 214% in other Western Hemisphere countries.

The comparable increases in total energy demand, Cadle added, are 75% in Western Europe, 142% in other Eastern Hemisphere areas, 83% in the U.S., and 161% in the remainder of the Western Hemisphere.

The long-range study of expansion in petroleum demand is based primarily on anticipated population growth. The population of the free world is expected to exceed 2-billion by 1975, up 30% from today.



The fastest regional growth predicted during the next 17 years is in Western Hemisphere areas outside the U.S., where 1975 population is expected to reach 291-million, up 50% over today's level.

Population in the U.S. will rise 33%, to 227-million, by 1975. Western Europe's expansion is likely to be the slowest, increasing only 12%, to 352-million. In the remainder of the Eastern Hemisphere, the rise is expected to amount to 31%, boosting the population to 1.2-billion by 1975.

But growth in petroleum demand will also be tied directly to the potential economic development of various areas, and to the competitive advantages of oil over other fuels.

In Western Europe, for example, the rise in population will be the smallest for any major world area, but the large gain in petroleum demand will result from the competitive advantage it has over other fuels in supplying the energy needs of the growing European economy, according to Cadle.

Because of the growth of industrialization in Western Europe, fuel oil demand may almost quadruple by 1975, he predicted.

It will fill the gap between total energy needs and available local fuel supplies. In addition, heavy fuel will increasingly replace coal as the primary source for industrial fuel and electricity generation.

Europe's hydroelectric development will be limited, and Europe has little natural gas, Cadle noted. Coal production is expansive, leaving a broad area of growth for petroleum.

Use of heavy fuel oil will experience a substantial growth in all of the Eastern Hemisphere.

In the areas outside of Western

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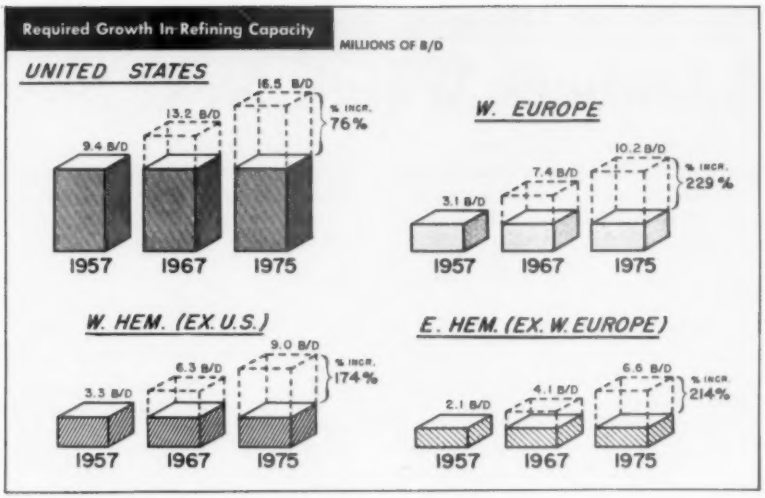
PUBLIC AFFAIRS: Kerryn King, left, New York, CPA chairman, and John H. Bivins, New York, CPA director, talk public relations.

RELATIVELY SPEAKING: C. J. Fontaine, left, Reed Roller Bit Co., Houston, and T. L. Fontaine, Hunt Tool Co., Houston.

IOCC: Earl Foster, general counsel, Interstate Oil Compact Committee, Oklahoma City.



Europe, a growth of 202% by 1975 is forecast by Cadle.

In Asia and Africa, he predicted, residual fuel oil consumption will rise to 2.6-million b/d by 1975, compared with less than 900,000 b/d in 1957.

In Japan, where coal is expansive, water power is highly developed, and natural gas is scarce, fuel oil will loom large in the energy use pattern.

In the Western Hemisphere, residual demand will not grow so fast, due to greater competition from alternate fuels—notably natural gas.

The growth in the use of heavy fuel oil in the U.S. will amount to 46% by 1975. In other Western Hemisphere areas, the increase will be 135%, Cadle predicted.

Distillates demand also will grow fastest in the Eastern Hemisphere, where competition from other fuels will not be great.

In Western Europe, distillates demand will rise by 234%, due both to a rise in railroad dieselization and to home heating, Cadle predicted.

In other Eastern Hemisphere areas, a 226% jump in distillates demand was predicted, due to growth in space heating and greater use of diesel-powered equipment for agriculture and industry.

In all Western Hemisphere areas, natural gas will fill an increasing proportion of the heating demand.

Demand for gasoline will experience a healthy growth in all free-world areas, with the greatest increase in Eastern Hemisphere.

A 214% jump in gasoline demand was predicted by Cadle for Eastern Hemisphere areas outside of Western Europe, due to the present low standard of living and a corresponding low consumption of gasoline.

In Western Europe, gasoline demand is expected to rise by 195%, as industrialization continues, vehicle ownership increases, and air travel rises.

Russia 'Invades' Latin America

The Russian Bear thrust its heavy foot through the Latin American trade door last week. And it aims to push further into that traditional U.S. market.

The $100-million oil equipment credit pact concluded with Argentina is the first Soviet credit or loan to any South American country (PW—Nov. 7'58,p6). But it's not likely to be the last.

The Argentine oil equipment pact is in addition to an existing commercial trade agreement between the two countries, under which the Russians are supplying 1-million tons of crude to Argentina (PW—Jun.27'58,p54).

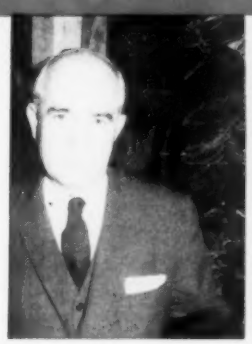
The Russians are wasting no time in following up the opening provided by the new Argentine agreement.

The government newspaper Izvestia said last week that the Soviet Union is willing to make similar pacts with other Latin American countries.

Premier Khrushchev, the paper said, has offered Soviet equipment and technicians for industrial development of Brazil. Moscow sources say no talks are yet under way. But Brazilian sources have previously reported that such an offer—including oil and oil equipment—was made through non-diplomatic channels, since there are no official relations between the two countries (PW—Jul.18'58,p79).

Terms of the credit extended to Argentina may be the tipoff to the kind of competition U.S. oil equipment suppliers may be faced with in other countries short of foreign exchange, as well as in Argentina.

While the entire $100-million cred-



CIRCULATING: Alden S. Donnelly, Honolulu Oil Corp., San Francisco.

EXCHANGING VIEWS: Ray Shaffer, left, Welex Inc., Fort Worth, and R. B. Kelly, Pure Oil Co., Chicago.

CROSS COUNTRY: M. E. Montrose, left, Hughes Tool Co., Houston, and T. Sutter, Baker Oil & Tools, Inc., Los Angeles.

it is to be expended within eight months, repayment—in Argentine goods—will not start for three years. After the first payment, the remainder will be paid over seven years, at 2.5% interest.

"We are prepared to purchase in the U.S.—on the same terms," said Jose B. Liceaga, chief of the six-man Argentine delegation that set up the Moscow deal.

While the Soviet agreement will not affect Argentina's existing oil development contracts with U.S. companies, it definitely cuts down future opportunities for participation, according to Liceaga.

However, there has been no indication yet as to just how still-pending offers from U.S. and other foreign companies might be affected. They include proposals for oil supplies, development drilling, services, and financing, as well as equipment.

The first indicator might be the outcome of current negotiations on the Atlas Corp. group's $790-million bag of proposals, which include financing for equipment purchases (PW—Oct.17'58,p6).

The Russian deal will fill "almost all" of Argentina's oil equipment needs for the next three years, Liceaga told PETROLEUM WEEK.

There is some Soviet equipment, however, that does not match Argentina's electrical requirements—compressors for example.

Liceaga said he does not think Soviet technicians will be needed to help in Argentina.

Argentine technicians in the negotiating team were impressed with what they describe as the up-to-date drilling and production equipment they saw in operation in Bashkiria, Russia's "second Baku."

On commercial accounts . . .

Jobbers Weigh Next Step

"Moderate" jobber leaders last week beat back for the time being a new bid to take the boiling commercial accounts issue into the nation's capital.

Meeting in Chicago just before the annual convention of American Petroleum Institute, the National Oil Jobbers Council voted to delay action during a "final" fact-gathering period.

However, NOJC's executive committee was given a green light to complain to Congress when it meets in January if the committee feels "adequate evidence is at hand" and that the evidence will be "personally presented by a sufficient number of representative jobber witnesses."

Support for this was voted by 23 of the 31 state jobber groups.

Despite the decision to mark time, however, practically all jobbers are convinced that something will have to be done about supplier sales to commercial accounts at what the jobbers consider discriminatory prices—often lower than the prices to the jobbers themselves.

Says Miles M. Mills, the re-elected NOJC president, "Under the pressure of oversupply, the ingenuity of each (supplying company) marketing department is being called upon to seek outlets for its products where bargain prices will not affect its price structure within the usual marketing area. Cargoes are offered at distress prices for delivery to distant points. Special prices are offered to commercial consumers that have never been customers before. Private brand station marketers are offered gasoline price inducements by these integrated companies in an attempt to avoid reducing the prices offered on the branded merchandise.

Says a spokesman for an Eastern jobber group: "The members of this association have lost millions of gallons of business because they couldn't meet the price to commercial business."

Adds a Midwest jobber, "Understand, we're not protesting the low prices—we're protesting the fact we can't buy that cheaply."

The major suppliers are almost as unhappy as the jobbers about commercial accounts. They say they have to meet competition. And some of the majors have lost large volumes in the price fighting. In addition, there has been criticism of some of the jobbers themselves for offering "uneconomically low" prices to get commercial business.

No one has the cure to the commercial accounts headache, since it's partly caused by marketing economics—which in many growing metropolitan areas leaves little room for the jobber function. But most are agreed the situation would be a lot better if refiners cut back refinery runs so that excess product did not reach the market in large volumes.

The increasing number of jobbers who are selling out to big oil companies is only partly explained by the disturbed price structure. The main reason is the tax picture. The veteran jobber with no son or relative to take over the business in most cases is finding his family stands to gain most if he sells the company.

SEEN AT API BY A PETROLEUM WEEK CAMERA

CHIT CHAT: Mills Cox, left, Transwestern Pipeline Corp., Houston; John McMillan, Monterey Oil Co., Los Angeles; W. I. Spencer, First National City Bank, New York City.

SUPPLIES: Grover Kilgore, Halliburton Oil Well Cementing Co., Duncan, Okla.; Raney Elliott, J. & L. Supply Division, Jones & Laughlin, Tulsa; Fred Murray, Oilwell Supply Co., Dallas.

LOOKING: J. H. Kellerman, Refiners Marketing Co., Los Angeles.

What's New / IN THE INDUSTRY

The API's Committee on Public Affairs plans a "substantial" defense against expected 1959 Congressional attacks on oil. The group, according to Kerryn King, chairman, will fight efforts to cut percentage depletion, oppose so-called "anti-competition" legislation, such as last year's S.11 bill, and work against the passage of bills for divorcement of marketing from integrated oil operations.

The committee also is mapping a program to combat "broadside" critical attacks on the petroleum industry.

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A triple completion has been made without using tubing. Humble Oil & Refining Co. did it in the Raccoon Bend field in Austin County, Tex. Only surface casing was set. Three strings of 2⅞-in. casing were clamped together, lowered, and cemented into place to serve as tubing. Then a special gun was used to perforate each producing zone.

Humble considers the "tubingless" completion a big step toward trimming well completion costs. Figures are still being calculated, but Humble notes that the method saves about one-third the cost for a single well. And in a triple completion, the cost of two additional wells is saved.

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The recently-formed Oil Industry Conservation Forum is pushing ahead. Five regional subcommittees have been set up to help shape the group's program, aimed at promoting wider well spacing and other conservation policies. The next meeting of the over-all steering committee is planned for early December.

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Oil, Chemical & Atomic Workers union has told its locals to take strike votes and to serve strike notices. This does not mean that OCAW is going to stage a series of strikes soon. It simply gives their bargainers authority to use a strike threat in an effort to speed negotiations. The union says it has already started taking strike votes in several places, including Sinclair plants, where OCAW has 9,000 members.

Teamster unions have won a 10¢ an hour wage hike in the Chicago area, but oil firms say this will not set a pattern for refinery or other oil employees.

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Some Texas producers are going to get a higher price for their natural gas. West Central Texas Oil & Gas Assn. members were told last week that Lone Star Gas Co.—the area's chief buyer—had agreed to renegotiate contracts. The price hike is to be 3¢ per thousand cu. ft., with an additional 2¢ boost in five years and, thereafter, a boost of 1¢ each five years.

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American Oil Co. is closing down a refinery—its 25,000 b/d plant at Destrehan, La. Shutdown work is starting immediately, and the 44-year-old plant will be dismantled shortly after Jan. 1.

•

The federal government is seeking nominations for lease areas off the Florida Keys. If you're interested, you can get copies of leasing maps from the Bureau of Land Management, Room 650, Federal Bldg., New Orleans, or from the Bureau of Land Management, Washington 25, D.C. Cost: $1 per map.

INSIDE *Slant*

DOUBLE TALK

It always has been said that you can't have your cake and eat it too.

And nothing bears out that old saying more than some of the statements accompanying financial reports for the first nine months of 1958.

Some of the larger companies have placed much of the blame for reduced earnings on restricted imports because of the government's voluntary control plan.

And, at the same time, they say that another contributing factor has been the reduced allowables in the southwestern and Mid-Continent oil states.

This is where it becomes apparent that companies are trying to have their cake and eat it too.

It is obvious that the higher the rate of imports the lower the rate of domestic production, provided there is no material increase in demand.

And it would be a little difficult to convince the producer otherwise.

For he has seen his allowable go down as the rate of imports has gone up.

If this were not true, the independent producer would not be pushing the government for controls which would hold imports at a proper level.

After all, none object to imports as such—only to the rate.

Leroy Menzing
EDITOR

Looking Ahead in Washington

McGraw-Hill
Washington
Bureau
November 14, 1958

The new Congress will require a good, close look by the oil industry. It's still too early to foresee many of the specific actions in store, but the trend is apparent. After last week's elections, Congress will shift to the left, although not abruptly. It probably will push for more government spending, perhaps more government control. Chances for decontrol measures are slim.

Look at Lyndon Johnson's new legislative program, outlined last week in a speech at Big Spring, Tex. Two years ago, the Senate majority leader called for enactment of a natural gas bill. This year he didn't mention the gas legislation. Johnson has written off the bill's immediate chances. President Eisenhower probably will do the same thing. A gas bill will get little if any encouragement in his coming messages to Congress.

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The expected depletion inquiry is likely to come in the House. Rep. Wilbur Mills (D., Ark.), chairman of the House Ways & Means Committee, will take a major look at taxes. Depletion will probably figure in Mill's planning. Although House Speaker Sam Rayburn (D., Tex.), Mills, and other Democratic leaders probably will help keep depletion from getting into trouble in the House, the new make-up of the Ways & Means Committee will be important. All House committees will be weighted heavily with Democrats, some of whom won't look upon the oil industry with much favor.

In the Senate, depletion is still considered safe, despite the increase in antidepletion votes. The depletion issue could be a good example of what the next Congress may do in many fields: create a lot of smoke, but not too much fire.

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Watch for new names in key congressional spots. The Democrats will have few changes, but there will be some worth noting. For example, Rep. Wayne N. Aspinall (D., Colo.) will become chairman of the House Interior Committee. Aspinall is a big backer of oil shale development. But the Republican lineup will shift drastically. Last year's fifth-ranked GOP member of the House Interstate Commerce Committee, Rep. John B. Bennett (R., Mich.), becomes ranking minority member of the committee. There will be a similar GOP shakeup in the House Judiciary Committee, which may start a new round of antitrust hearings next year.

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Sen. Everett Dirksen (R., Ill.) is in line for the Senate's minority leadership. There's still a chance that Sen. Leverett Saltonstall (R., Mass.) might lead the GOP in the Senate, but Dirksen seems to be the front-runner.

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Sen. Hubert Humphrey (D., Minn.), sometime critic of oil marketing, is on the rise. Humphrey probably will be the spiritual leader of the liberal group of Democrats, which now will command a stronger position in the Senate. If Humphrey decides to push marketing legislation, he will be in a favorable position to do so. His house counterpart on marketing, Rep. James Roosevelt (D., Calif.), won reelection handily, and is expected to be active next year.

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Look For a Big Gas Play in Alberta

Tremendous thicknesses in gas-bearing sediments mark the 500-mi. foothills belt.

The export market is the biggest factor behind present campaigns to develop new gas reserves in the area.

Drilling to date has been widely scattered, but discoveries have been impressive, giving rise to estimates of tremendous reserves.

Canadian oil men, with a wary eye on export recommendations, are sizing up drilling programs for Alberta's long foothills gas belt.

Huge gas reserves now credited to the 500-mi. belt on a possible or probable basis are being evaluated for promotion to proven status, as companies with holdings in the region prepare to outline and take advantage of the belt's potential.

Favorable recommendations regarding gas exports were contained in the recently-released interim report of the Borden Commission. But hints of delay in the report are serving to temper industry optimism.

The commission reported that proved Canadian gas reserves are far in excess of Canadian requirements, and suggested that exports to the U.S. are desirable (PW—Nov.7'58p18).

But a fear of possible delays in export has arisen over the commission's recommendation for establishment of a National Energy Board endowed with sweeping powers over exports and imports. This, according to the Canadian Petroleum Assn., would mean government study of the nature of the proposed board, "a process which may well take a year. Then reapplication to the new board for export permits will be necessary. This means another delay."

The export situation is the biggest factor in the development of the tremendous gas reserves in the foothills belt.

Speculation about gas sales contracts and provincial-federal policy on exports invariably becomes entwined in Canada with any discussion of field development programs, as the extent of the latter rests almost entirely on improved market conditions.

Before the commission's report was issued, one independent had predicted that the report would contain sufficiently strong assurance of gas export without delay so that large-scale development programs for the foothills could be contained in 1959 budgets.

Now he says that "the industry is studying the implications of the report, and still does not know which way to turn on budgets for 1959."

One good development appears positive: The Alberta Oil & Gas Conservation Board is expected to make favorable decisions on pending gas-export applications within a matter of weeks.

The board is now considering plans by Westcoast Transmission Co., Ltd., and Alberta & Southern Gas Co., Ltd., to build jointly an Alberta-to-California gas pipeline. Gas to feed this line would be bought in the foothills area. The 36-in. line would run 105 mi. from the Alberta-British Columbia border through Crowsnest Pass to the international boundary near Kingsgate.

In separate applications to the Board, Alberta & Southern asked for 4.2-trillion cu. ft. of gas over a period of 25 years, and Westcoast asked for 1.3-trillion cu. ft.

Among additional contracts up for approval by the board is a gas sales contract for reserves in the Berland River area. It was the consensus among observers earlier this month that Alberta & Southern would receive this contract.

The amount of gas reserves credited to the foothills belt is still in the rough-guess stage. But despite variations in estimates, it's agreed that reserves are enormous.

Alberta's exportable surplus of gas has undoubtedly shot upward, because of extensive finds this year.

But it will take a while for Conservation Board and Canadian Petroleum Assn. figures to be revised officially.

In September, the Conservation Board estimated that gas reserves will increase by 2.4-trillion cu. ft. yearly. As of Dec. 31, 1957, proved gas reserves in the foothills stood at 7.6-trillion cu. ft.

Big Strike: Berland River

Adding to the abundance of reserves in Alberta is the biggest gas strike in the province: Berland River.

In this area, just east of the foothills belt, in the deepest portion of the western sedimentary basin, British American Oil Co., Ltd., and Shell Oil Co. of Canada, Ltd., made what is regarded as the most significant gas find in Western Canada's drilling history.

Says B-A's president, E. D. Brockett: "The discovery has the largest potential of any gas well in Canada, and is certainly one of the most prolific in the world."

The discovery, No. 8-A Berland River, was drilled on a 400,000-acre Crown reservation block held jointly by the two companies. The D-3 (Devonian) was encountered at 12,014 ft., and a total of 551 ft. of productive sand were penetrated. The well flowed 57-million cu. ft. per day through 1-in. choke. With no pipeline outlet, the well has been shut in.

B-A's announcement said that the discovery is "Canada's deepest productive D-3 reef, and has the thickest gas pay of any reef discovered in Canada to date."

More drilling is needed at Berland River to get some idea of just what the one well drilled so far has tapped.

No estimates have been made as to the possible areal extent of the gas reservoir. Any such estimate on the basis of present data would be, in the words of one B-A official, "highly speculative."

"We are currently preparing to drill a 3½-mi. stepout in order to get a better indication of the real extent of the Berland River reservoir," says Brockett. "This very significant discovery will add about 140-billion cu. ft. to B-A's reserve for each section drilled to a pay zone comparable to the discovery well."

It's also possible that additional tests will be drilled by other operators in the area. Other land holders include Pan American Petroleum

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Corp., Imperial Oil Ltd., Canadian Fina Oil, Ltd., Texaco Exploration Co., and Mobil Oil of Canada, Ltd. All land in the region is held in Crown reservations.

This region, says a B-A official, has always been regarded as highly prospective, as it contains numerous potentially productive zones. However, he says, the great depths necessary to test these zones, and the rugged terrain, have militated against extensive exploration. "A number of wells have been drilled in the past to test shallower horizons. But the Leduc D-3 has been considered an important prospect for some time."

Nearest Leduc D-3 production is at the Windfall gas field, 40 mi. east.

It was noted by B-A that "well control is very sparse, and there are very few dry holes in the history of the immediate region."

A dry hole near the big strike was Pan American et al No. 1-A Head Creek, which contacted a water-bearing Leduc reef about 15 mi. up-dip to the east.

Asked how this affected subsequent drilling plans, a B-A spokesman said that "neither it nor Pan American No. 10-10 Berland River, which is approximately the same distance down-dip, have in any way affected our plans for the area."

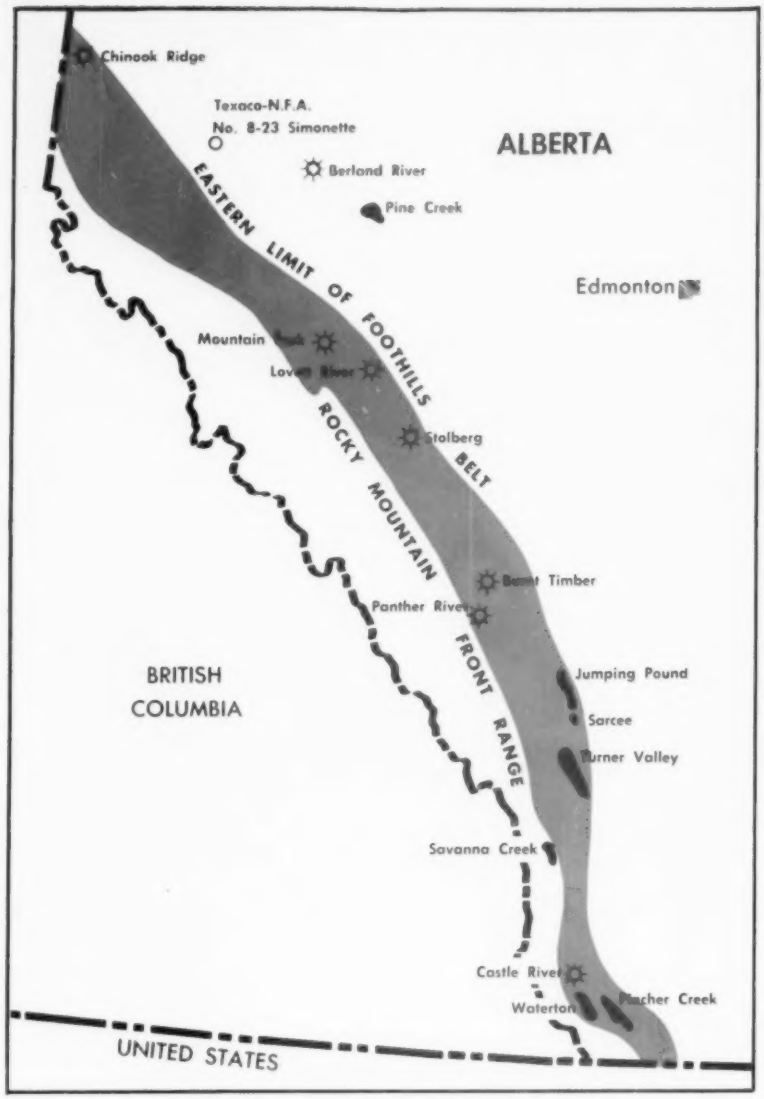
Berland River marked the deepest Leduc D-3 reef found in Canada. A test now drilling west of Berland River has already set a new record as the deepest well in Canada.

Texaco-Northern Foothills Agreement No. 8-23 Simonette is scheduled to bottom at 16,500 ft. in a test of the Cambrian. Originally, it was scheduled as a test of the Mississippian at 13,000-14,000 ft. At final depth, it will be 1,305 ft. deeper than the existing record of 15,195 ft., held by British-American et al No. 6-4 Lambert Creek, which found noncommercial gas in the Devonian.

The out-in-the-wilderness strike at Berland River points up one of the most significant facets of operations in this whole area, including the foothills: Rave notices given to the area are based on a very thin scattering of discoveries.

As a whole, the foothills region has been viewed as good prospective ground for exploration over a stretch of 1,000 to 1,500 mi. About 500 mi. of the belt now represent sources of reserves for export from the province.

In addressing the Canadian Assn. of Oilwell Drilling Contractors over a year ago, Paul L. Kartzke, Shell vice-president, said that in the southern foothills—where most of the work so far has been done—only one wildcat



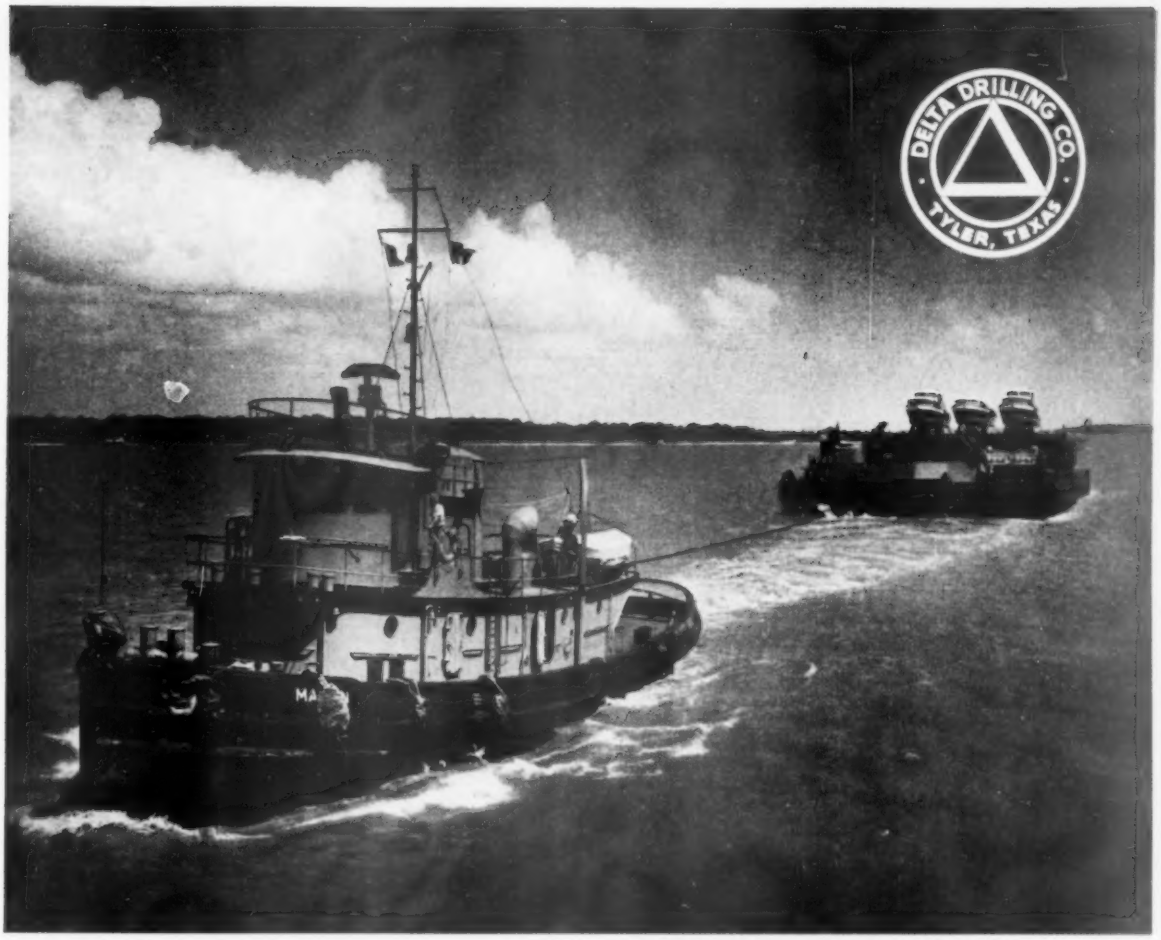
for every 500 sq. mi. has been drilled. A Shell spokesman says this is still a good estimate.

On the basis of studies, the Conservation Board acknowledges that exploratory drilling in the Alberta foothills and adjacent areas during the past two years has accounted for most of the important discoveries of gas reserves in Alberta. One study quoted by the board shows that about 2.2-trillion cu. ft. are attributable to these new discoveries. So far, out of 170 wildcats drilled in the foothills area, four huge gas fields have been discovered—Pincher Creek, Waterton, Savanna Creek, and Jumping Pound. Important single-well discoveries include Mountain Park, Lovett River, Stolberg, and Burnt Timber.

Even a moderate rate of drilling in the foothills will turn up huge reserves, according to Shell. "On the basis of the number of tests already completed or drilling this year," the company estimates, "at least 15 wildcats will be completed during 1958. Shell believes that at least 1.8-trillion cu. ft. of gas will be added to foothills reserves each year if incentive is provided for even this moderate rate of drilling.

In a forecast of drilling activity, the Conservation Board says: "It is assumed that activity in the foothills and northern areas will increase, while that in the eastern area will decrease, leaving the provincial total for the next 15 to 20 years at 400 wells per year."

For some of the established fields in the foothills, the board has estimated the number of wells each would contain if fully developed. Pine Creek, which now has 4 wells, would have 13;



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". . . as the foothills area is yet virtually unexplored . . . we can only speculate on much of the geologic history . . ."

FOOTHILLS starts on p. 28

Jumping Pound has 11, eventually would have 15. Sarcee has 2, eventually 4. Pincher Creek has 9, eventually 20. Panther River has 1, eventually 4. Waterton has 5, eventually 64.

The discoveries that have been made so far have been based pretty much on surface geology. Geophysically, the whole belt is still uncharted territory.

In a report to the Borden Commission, Shell noted that most of the reserves in the foothills area have been found so far in Mississippian rocks, and in structures apparent from surface geology, although usually the presence of a structure has been verified by geophysical means.

Says Shell: "We can see enough structures of this type to keep the industry busy wildcatting, at the rate we predict, through 1961.

"If the incentive continues, we believe that many buried structures, not apparent from the surface, will be found by geophysical methods. Furthermore, our recent discovery of gas in the Devonian at Panther River opens up possibilities of reserves in a new zone in all areas where this formation has not been tested."

Geologically, the younger rocks of Mesozoic age are mainly sands and shales. These strata are approximately 10,000 ft. thick in the foothills area, and contain several potentially productive sands such as the upper Cretaceous Cardium formation. The older carbonates of Mississippian and Devonian age also have yielded oil and gas in this area. The prolific Leduc (D-3 Devonian) deposits in the Berland River area occur at a depth of about 12,000 ft. The underlying Elk Point and Cambrian strata also have potential, but because of their great depth remain as yet untapped.

Says one company spokesman: As the area is yet virtually unexplored, it is extremely difficult to paint an accurate geologic picture. We can only speculate on much of the geologic history."

Another Big Strike

A dual gas completion at Panther River is also boosting morale in the foothills area.

Shell's No. 1 Panther River was completed in February as a Nisku (D-2 Devonian) gas producer, the first Alberta well to produce natural gas commercially from the Devonian. It also was the first productive reef build-up found in the foothills. The company opened up 183 ft. of Devonian pay below 8,988 ft.

By August, the operator had penetrated through the Cambian. Then the well faulted, and went back into another sequence of series before entering the Mississippian at about 13,000 ft. and opening a 713-ft. pay zone in this formation.

Mississippian production is found elsewhere in the foothills belt, but at depths of 5,200 ft. to 5,800 ft.

The test has been shut in without establishing an initial potential. On a 14-hour test, the well flowed gas from the Mississippian at the rate of 6.2-million cu. ft. per day through a 24/64-in. choke. Gas from this reserve contains an extremely high percentage of hydrogen sulfide.

A previous well in the area—although not drilled to the Devonian—together with seismic information, provides some control as to the extent of the structure.

The Conservation Board believes that five sections can be considered as proven, and that further extension of the productive area will depend largely on the presence of a water column on the flanks of the structure.

Shell holds approximately 98,500 acres in this area.

Other areas—as yet only sketchily defined—also await development. Among them:

- **Waterton:** This field was discovered in January, 1957, by the drilling of Shell No. 1 Waterton. About three months later, Texaco Exploration No. 3-4-A Castle River encountered gas in the same Mississippian horizon, about 10 mi. northwest of the discovery.

Subsequent drilling indicates that these two wells are on a structural trend extending in a northwest-southeast direction for about 20 mi. Whether the reservoir is continuous over the full distance remains to be proven by further drilling.

Shell, which holds 200,000 acres in the area, is now drilling No. 5 Waterton, as a test of the Mississippian at about 14,500 ft.

Waterton is about 15 mi. west of the Pincher Creek field, in the southwestern corner of the province. Gas occurs chiefly in the Mississippian limestone, but a smaller reserve of gas is known to be present in the Wabamun (Devonian) in the northern end of the field. Gas from this field con-

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Chiksan has developed a new kind of swivel joint for oil well cementing. This joint has a wide turning radius and a new process-hardened steel to minimize cavitation and washout, plus a new wedge-shaped packing that cannot be sucked into the stream. It's called the Longsweep and it has produced highly spectacular results.

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". . . thick pay sections in giant structures will result in an acceleration of exploration . . . "

FOOTHILLS starts on p. 28

tains a relatively high percentage of hydrogen sulfide.

• **Lovett River:** This is a one-well field, about 50 mi. west of Pembina.

The discovery, B-A-Triad Oil Co., Ltd. et al No. 12-30 Lovett River encountered gas in the Rundle (Mississippian), and recorded flows on drillstem tests at rates up to 17-million cu. ft. per day. No oil or water was encountered.

Since only one well has been drilled to date, the Conservation Board has arbitrarily assigned 1,100 acres as a factor in gas reserve calculations. With further development, says the board, sufficient gas reserves might be proven to make it attractive for a pipeline.

• **Pine Creek:** The reserve was opened by Hudson's Bay Oil & Gas Co., Ltd. et al No. 1 Pine Creek, early in 1957. As of September of this year, four gas wells had been drilled to the Leduc D-3 formation in the field. Depth is approximately 11,000 ft., and the maximum gross pay thickness is 230 ft.

Wells drilled to date have not clearly defined the boundaries of the field, and the 7,000 acres presently considered productive may be extended by further drilling.

• **Stolberg:** Triad-B-A No. 6-10-A opened this field in 1957. To date, no further drilling has been done on the structure.

Gas flows of up to 3.5-million cu. ft. per day were reported from drillstem tests of several fault blocks in the Mississippian at a depth of about 13,000 ft. Little is known of the extent of the reservoir, and the Conservation Board has arbitrarily assigned 1,100 acres as a factor in its calculation of gas reserves.

Until further reserves are established, the board considers this field to be beyond economic reach.

In all areas of the foothills belt, drilling is deep, difficult, and expensive.

A round sum of $1-million is a frequently used figure for the cost of a well, although costs vary considerably. For example, wells drilled to a depth of about 10,000 ft. at Jumping Pound cost $250,000 to $300,000 each.

B-A's joint operation with Shell at Berland River came about through the need to reduce the cost required to evaluate the deep reservoirs. In that area, operations are hindered by muskeg and rivers. Roads built either by oil companies or logging companies can be used only in the winter. The nature of the terrain creates many problems because of its considerable relief. Drilling must be carried out from a permanent base camp, and an aircraft and radio are essential.

Drilling takes a long time. Shell's discovery at Waterton was spudded on May 21, 1956, and reached a total depth of 14,045 ft. in April, 1957. Says a Shell spokesman: "There wasn't any particular reason why it took so long—it's just rough stuff, and complicated geologically."

But the thick pay sections found so far are a big lure in attracting more drilling.

Says B-A: "The deep and difficult drilling and heavy exploration programs required add to foothills costs, but the attraction of thick pay sections in giant structures will result in an acceleration of exploration activity in the foothills area."

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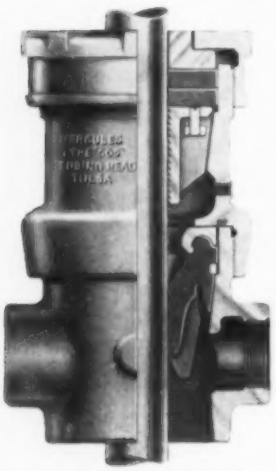

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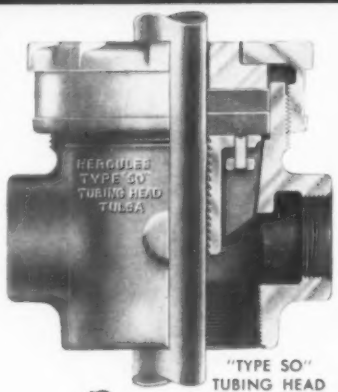

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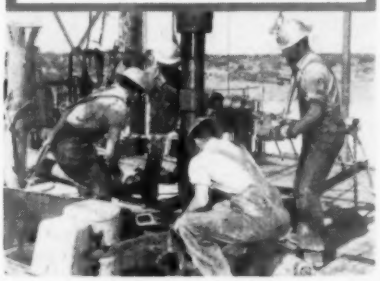

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Diamond Turbo Bits Do Well in Tests

- **Turbodrill tests in West Texas, Montana, and Alberta show that newly-designed diamond turbo bits having large spiral waterways give better operational life.**
- **The biggest diamond-bit difficulty—center burnout—appears to have been licked.**

Newly-developed diamond bits may spur turbodrilling efforts in the United States.

Up to now, widespread use of the turbodrill has been limited by inability of existing rock bits to give satisfactory life when subjected to the turbodrill's high speed and power.

The relatively short life of these bits, necessitating more frequent and costly round trips, has been an offsetting factor to the much greater penetration rates achieved.

A key factor in rock bit wear has been bearing life, a problem which is presently being tackled by several rock bit manufacturers—with some reported degree of success.

Diamond bits previously had one major drawback—center burnout—that made them unsuitable for turbodrill operations.

The use of diamond bits with the turbodrill was rather scattered in the beginning, and results with diamond bits designed for rotary use was not too impressive.

Penetration rates were usually somewhat better than average, but bit life was short, and damage to diamonds made use of these bits economically unattractive.

The effectiveness of the center and outside diameter sections leaves the face of the bit subject to the most rapid wear. Generally, this part of the bit functions well until such time as the diamond exposure decreases to the point that fluid flow over the face becomes ineffective. As flow across this section of the bit decreases, heat builds up, diamonds are damaged, and ringing out occurs—sometimes very rapidly. Penetration rates will be very steady, but, within two or three feet, they will drop by 50% or more, and the bit will have been ringed out.

A series of turbodrill tests still under way by Shell Oil Co. in West Texas, Montana, and Alberta indicates that the center burnout problem has been licked.

Eight tests have been carried out so far—three in the Waterton area of Alberta, two in the Cedar Creek anticline area of Montana, and three in West Texas.

The tests are part of a 24-hole program that began last spring and will continue to the spring of 1960. Tests also are being considered for other areas, including California, the Four Corners, and Louisiana. The program's aim is to run the turbodrill under a variety of conditions to get as complete a picture as possible of its potential.

Diamond bits and experimental rock bits were, and are, important elements in the test runs.

The normal-spiral, full-faced diamond turbo bits used in the tests were developed by Christensen Diamond Products Co. Christensen started its research and the development on the turbo bit in France, where the company has a plant (in Paris) to service French turbodrilling developments.

A new type of 12⅛-in. diamond turbo bit, developed early last year, had large waterways and diamonds set on spiral pads. It was the first to show possibilities of the diamond bit on the turbodrill, and touched off a development program by the company which has led to signficant discoveries, paving the way to further improvements.

The company learned that it is of primary importance in any turbodrill design that the pressure drop through the bit be kept to a minimum to prevent loss of turbo power and excessive flow through the axial bearing.

The spiral layout and large waterways have proved to be effective in cooling and cleaning diamond bits, Christensen reports.

The differential pressure built up across the cutting elements provides effective cooling of the diamonds and removal of the cuttings as long as the diamonds are exposed above the matrix.

Recent studies in France have shown that a reverse or leading spiral provides even more effective flushing than the conventional, or trailing, spiral—at the expense of only a small pressure increase, according to the company.

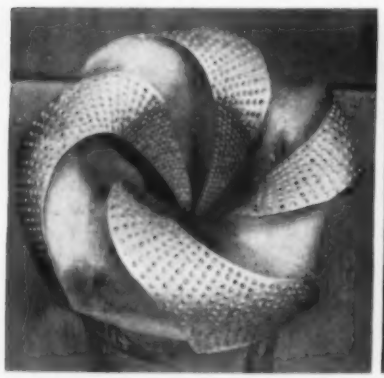
The leading spiral, tests indicate, does better in hard formations, but the trailing spiral is more effective in softer formations.

It is believed that the tremendous washing action developed through the center of the bit is responsible for this improved performance.

Also, the company reports, the large cuttings recovered during turbodrilling of hard formations indicate that the steep cone formed by this type of bit has a tendency to break off before it is fully formed, and the combination of hydraulic action and large waterways allows these pieces to be carried away with little regrinding.

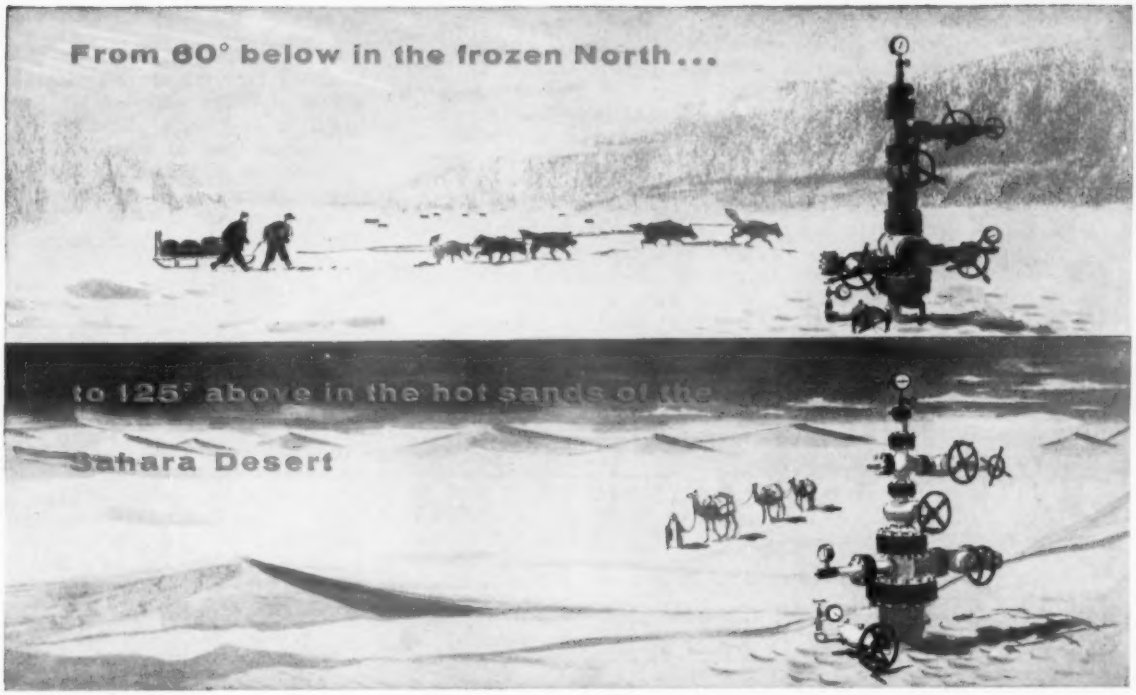
In one of the current series of turbodrill tests—in the Pine Unit field, Wibaux County, Mont.—a total of seven diamond bit runs were made in the interval from 6,780-9,000 ft.

The test site was Shell's No. 22-23-A, a routine 9,000-ft. development well drilled by the company's Rig No. 19, a National 100 powered by three



BEFORE its test run in Montana, this D-14 style Christensen diamond bit (D-1885) looked like this.

AFTER drilling 434 ft. in 41½ hours on one run and 30 ft. in 8 hours on another, bit looked like this.



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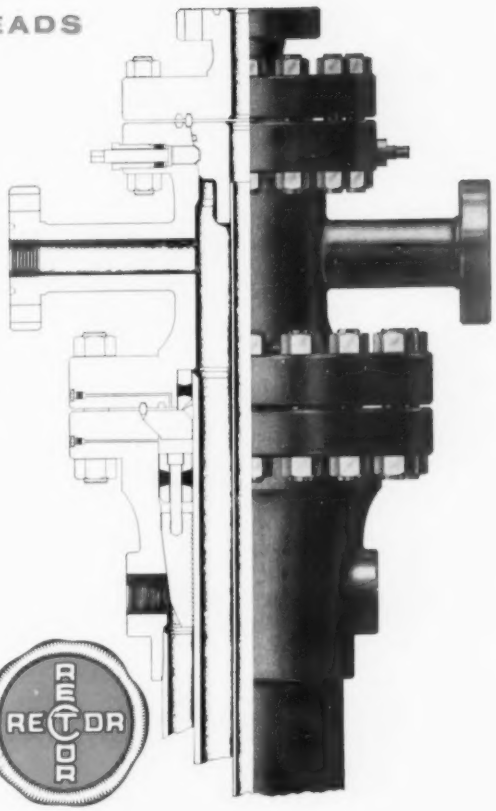

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The Dresser turbodrills used were 28 ft. long, 6⅝-in. O. D. standard (one section), having about 100 stages and developing 95 hp. lb. Design flow rate is 475 gal. per minute, and speed is 795 rpm.

The interval selected for the turbodrill test included sandstones, shales, and limestone. Two of the better-known formations in this interval are the Mission Canyon and the Lodge Pole.

On this test, only two principal variations of D-14 diamond-bit types were used. One had the so-called French center (bits D-1884 and D-1885) and one was a modification of the conventional rotary bit center, known as the American center (bits D-1882 and D-2455).

To evaluate the effectiveness of the direction of the spiral, bits with leading and trailing spirals were made with each of the two types of centers.

Each of the four 7 13/16-in. bits used had about 1,500 large stones, and each had a diamond weight of about 500 carats.

In the seven runs made on the Montana test, the biggest footage drilled with one diamond bit was 434 ft., in 41½ hours, which also was the longest time on bottom.

Here's how the diamond bits performed on each of the seven runs:

- Run No. 1—Bit D 1885 drilled 434 ft. in 41½ hours at a penetration rate of 10.4 ft. per hour.
- Run No. 2—Bit D-1884 drilled 162 ft. in 16¾ hours at a penetration rate of 9.7 ft. per hour.
- Run No. 3—Bit D-2455 drilled 275 ft. in 29¾ hours at a penetration rate of 9.6 ft. per hour.
- Run No. 4—Bit D-1884, a rerun, drilled 182 ft. in 33 hours at a penetration rate of 5.5 ft. per hour.
- Run No. 5—Bit D-2544, a rerun, drilled 91 ft. in 15 hours at a penetration rate of 6.1 ft. per hour.
- Run No. 6—Bit D-1882 drilled 15 ft. in 3¼ hours at a penetration rate of 4.6 ft. per hour.
- Run No. 7—Bit D-1885, a rerun, drilled 30 ft. in 8 hours at a penetration rate of 3.8 ft. per hour.

The current series of Shell turbodrill tests already has led to some important findings.

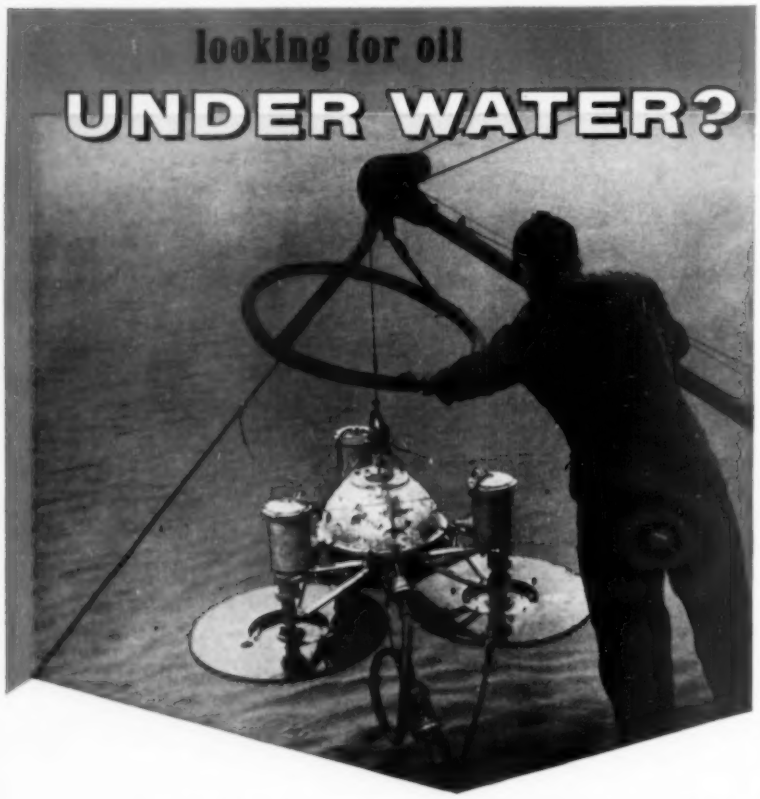
Here are some of the conclusions drawn from the Montana test:

- Large diamonds set in a conventional D-14 bit proved "quite economical" in the more drillable sections of the Mission Canyon.
- Performance of this bit style in the harder Lodge Pole section was not so satisfactory. It is believed that this was due to junk in the hole, and to the fact that a new bit was used on only one of the four runs in this section. It is also believed that bit specifications were not correct for this type of drilling.
- Improvements in flushing of the diamonds to increase rate of heat transfer to the mud is required in the harder sections, and would undoubtedly improve performance in the softer sections.
- The importance of pulling a bit before ringout occurs was proved, as was the inadvisability of rerunning a partially used bit.

The tests run so far also point to new avenues of investigation for future tests.

The most important objective is to improve diamond flushing action, particularly of leading face stones.

Other possibilities include an increase of diamond concentration on the leading face, a comparison of results obtainable from different stone sizes and quality, and investigation of various diamond-setting techniques,



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such as impregnation, circle setting, rib setting, and the like.

The wear of diamonds in the usaul sense is hard to understand when the difference in hardness between the cutting agent and the formation is so vast. It is known that diamonds at high temperatures are altered to graphite. And the possibility of diamonds reaching these temperatures does not seem too remote when the heat equivalent of turbo power is considered—100 hp. is equivalent to 254,000 Btu. per hour.

To dissipate this large quantity of heat through the diamonds would indicate that high differential temperatures are required, and it seems possible that temperatures of the diamond in contact with the formation could be reducing the diamond to graphite.

If temperatures in this range are developed, it is likely that the heat-transfer efficiency from the bit to the mud is very low. The components of drilling mud have low conductivities, and since diamond temperatures may be well above the critical temperature of water, it seems likely that most of the heat is carried through the bit and is transferred to the mud at a more efficient differential temperature, such as that which exists on the bit shank.

The number of variables involved in the actual process of heat transfer at the bit face makes these calculations speculative only. But it does point to a possibility of how diamonds are wearing, and indicates that further work along these lines is needed.

How to Cut Deep Oil Production Costs

A production engineer stresses closer matching of casing and tubing to well requirements, plus better casing and tubing, to make deep production profitable.

Two basic approaches on how to cut costs of deep oil production have been outlined by S. H. Davis, an Atlantic Refining Co. engineer.

Speaking before student petroleum engineers last week at the University of Texas, Davis stressed the scarcity of profits in deep wells, even though ample reserves are found.

"One major oil company is reported to have made a study which indicated that all of its recent ventures below 10,000 ft., when taken as a group, showed a very poor return for the investment," Davis noted.

A major investment in a well is the casing and tubing, he explained, which usually runs from 40% to 60% of the total well cost.

One way to cut costs is to develop better ways of detecting pipe imperfections, Davis said.

"Underground pipe collapse is an increasing problem as wells go to deeper depths and higher pressure," he pointed out.

He told of the magnetic-particle inspection equipment being used in some mills and by service companies, but said this equipment is manual and depends on visual inspection. "What we do need is engineering developments that will make it possible to eliminate the human element from pipe inspection," he said.

As examples of pipe defects, Davis mentioned cracks in tubing upsets, mill seams, and mill slugs.

Another factor that can contribute to casing and tubing failure, he said, is the improper use of slips and tongs. "We need improved tong dies and slips, ones that can't cause deep indentations in the casing and tubing," he added.

Lower deep-well costs also can be achieved through reduced design factors and better matching of the casing and tubing to the well requirements, Davis said.

He cited the intermediate casing string as an area where improvement can be made in matching the pipe to the well needs.

The collapse design for the intermediate string can be reduced, he said, since the string renders its primary service during drilling, and in many respects is useless after the oil string has been run.

He backed this up by saying, "A few engineers have lowered their design factors to 0.50 in collapse for intermediate strings. In working out a series of intermediate casing quick design charts based on this concept, it was found that the savings to be realized in their use will range from $2,000 to $30,000, depending on the length of the string."

Another area for cost cutting, said Davis, is in the selection of proper sizes of casing and tubing.

He stressed letting the well requirements determine the sizes used rather than habit, or standard practice.

"Engineers, whether they like to admit it or not," Davis said, "can become the victim of habit—habit so strong they don't look at a new idea with an open mind."

He said that for years the standards have been 2-in. tubing in 5½-in. casing and 2½-in. tubing in 7-in. casing. "An engineer suggesting 4½-in. casing is automatically met with a host of reasons why it can't be done," he said, "yet very few of the objections are really valid. Such reasons as 'tools aren't available for working inside smaller casing' are often cited.

"Of course tools aren't always available for some new combinations," Davis continued. "However, in every instance I can think of, tools have been available by the time the need arose. It is the engineer's responsibility to examine the requirements and then select the proper size casing."

Since design factors are needed as insurance against defects, and because of the risks involved if there is a failure, Davis concluded, "we either must eliminate as many defects as possible so we can be sure of our strength properties, or we must appraise the risk and decide if we can afford to take it."

Austrians Stabilize Loose Pay Sands

An Austrian company reports it has found a way to consolidate loose formations in which collapse of sand has blocked oil passage.

The company, Oesterreichische Mineraloel Verwaltungs A.G., says that wells shut in for many years in eastern Austria have been reactivated and are now producing.

A scientific team headed by Ernest Dolak developed a method whereby loose sand formations are treated with special (so far undisclosed) chemicals. Liquefied artificial resin is then injected to stabilize the formation.

The wells had been shut down when sand particles penetrated into pump mechanisms, causing undue wear and corrosion. After the wells were shut down, collapse of the sand formation blocked passage of the oil.

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What's New / IN EXPLORATION, DRILLING, PRODUCTION

Refraction Surveying Shows Revival

New techniques and goals have led to a revival in refraction shooting, the first seismic exploration method, according to C. H. Savit, Western Geophysical Co.

Savit says refraction surveying will be used in the future "to a degree undreamed of a scant three years ago." He made the comment at last week's meeting in Los Angeles of the Pacific Sections, American Assn. of Petroleum Geologists, Society of Exploration Geophysicists, and Society of Economic Paleontologists & Mineralogists.

Refraction shooting, which made a comeback in recent years, is used to supplement reflection surveying and other exploration methods.

Savit says the refraction method is finding a place for itself in some areas which never before had been subject to modern exploration, including marine areas. The flanks of a dome such as those in the Gulf Coast and in parts of Europe and the Middle East, can be delineated, he says, by a special refraction technique.

•

Leasing News

The Colorado Land Board has set a minimum of $10.60 per acre for oil and gas leases on state lands.

The new regulations specify that bids must be for a bonus of at least $10 per acre, plus filing fee of 10¢ per acre and first year's rental of 50¢ per acre. Bids are opened on the first Wednesday of each month.

Bonuses totaling $89,280 were paid for 17,600 acres of Montana lands at the state lease sale Oct. 30.

Shell Oil Co. paid $30.50 per acre for a tract in 23n-8w, Teton County. Gulf Oil Corp. paid $28 and $22.50 for two tracts in the same general area.

The next sale of leases on state school lands will be held on Dec. 12.

•

Magnolia Petroleum Co. has completed its $100-million acquisition of Freeport Sulphur Co.'s oil and gas properties in Louisiana's Lake Washington field.

The transaction gives Magnolia interests ranging from 10% to 50% in 58,000 acres.

•

Saskatchewan has approved use of 2⅞-in. tubing instead of casing for completion of field wells.

The province's Dept. of Mineral Resources approved the practice for Stekoll Oil & Gas Co., of Dallas. The province previously permitted such completion practices for edge or marginal wells only.

•

Claud B. Hamill, Houston, has acquired all of Lion Oil Co.'s nonproducing acreage in East Texas.

Consideration was $110,000 in cash, with Lion retaining a one-sixteenth override. In addition, the purchase included 14,400 acres in 21 counties.

•

Don't Underestimate Doodlebug Geology

Think twice before you run from the next doodlebug peddler—he may have the answer to your problem.

A survey shows that unorthodox ways of finding oil are on the right track 44% of the time, with fraudulent intent seldom involved.

A study of more than 100 offbeat methods of finding oil, conducted over a three-year period by Southwest Research Institute, San Antonio, indicates that most doodlebugs fail primarily because of fragmentary information, and an inadequate or unproven basis for measuring and interpreting their conclusions.

Working for five major oil producing oil companies, the Institute made the survey to screen and evaluate the various oil-finding methods offered by independent inventors, and thus provide the companies with early clues to promising new developments.

And despite the expected run of off-beat practices—such as the use of divining rods—a good many of the doodlebugs are based on such scientific approaches as radio-wave techniques, geochemical practices, and electrical methods.

Engineering

A new geophysical tool to give an improved visual record of seismic information has been unveiled by Sinclair Research Laboratories, Inc., Tulsa. The instrument, called the Seismod, gives the visual record "without loss of character," according to Sinclair.

A. C. Reid, electronics engineer who developed the tool, says the Seismod "facilitates the making of record sections that have some of the visual qualities of the variable-density section, yet retains the individual reflection character of the conventional or wiggletrace record."

•

A high-strength tubing joint with a newly-designed thread form that permits reduction in joint size, thus leaving more room in the borehole for casing or tubing, has been developed by Hardy-Griffin Engineering Corp. The company's Dual Seal joint has a thread form that is a modified truncated buttress type, which makes a metal-to-metal seal on the shoulders, leaving the crests unengaged.

Because of the thread's high joint efficiency, the company says, a minimum amount of upset thickness is necessary. The coupling is designed for pipe of P-105 grade and higher.

•

Drilling Highlights

Alberta—Northern Foothills Agreement Group No. 8-28 Simonette River, LSD 8-28-60-3w6, in the Alberta foothills area, has set a new Canadian drilling depth record. As of late last week, the test was drilling below 15,258 ft. toward a projected depth of 16,500 ft. in the Woodbend. The previous depth record was 15,195 ft., set earlier this year by British American Oil Co., Ltd., et al No. 6-4 Lambert Creek, west of Pembina.

Also in Alberta, Shell Oil Co. No. 12-9 Shell-Petrol-Explorers-Simon LSD 12-9-63-25w5, wildcat 35 mi. southwest of South Sturgeon Lake field, flowed 47.5-gravity oil at the rate of 400 b/d, and 3.2-million cu. ft. of

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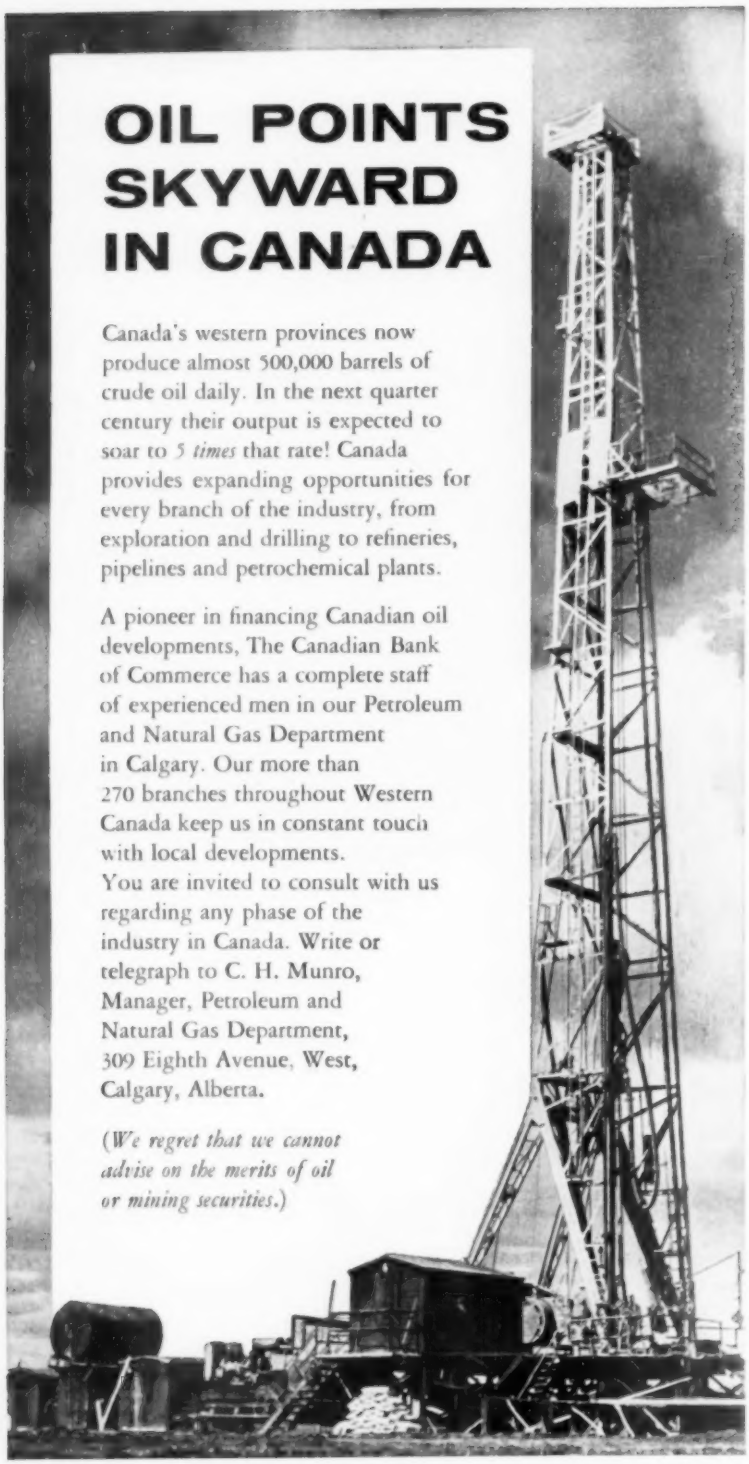

OIL POINTS SKYWARD IN CANADA

Canada's western provinces now produce almost 500,000 barrels of crude oil daily. In the next quarter century their output is expected to soar to *5 times* that rate! Canada provides expanding opportunities for every branch of the industry, from exploration and drilling to refineries, pipelines and petrochemical plants.

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(*We regret that we cannot advise on the merits of oil or mining securities.*)

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gas daily, on 1-hour, 47-minute drillstem test of the Woodbend at 11,420-70 ft.

East Texas—Jack L. Phillips No. 1 Richardson-Henry unit, J. Korn survey, Freestone County, flowed 56-million cu. ft. of gas per day plus 6 bbl. of condensate per million through perforations at 4,616-18 ft. in the Woodbine. The well also made 800,000 cu. ft. of gas daily plus 12 bbl. of condensate per million through perforations at 4,223-31 ft. and 4,233-37 ft. in the sub-Clarksville, which is also found in the Nan-Su-Gail field, 1 mi. southeast.

Wyoming—Pan American Petroleum Corp. No. 1 Robinson, section 32-50n-67w, Crook County, recovered 4,900 ft. of oil and 200 ft. of mud on 1-hour drillstem test of the Minnelusa (Pennsylvanian) at 6,030-107 ft., according to reports. The wildcat is 5 mi. east of Donkey Creek field, which produces from the Dakota (Cretaceous) and from the Pennsylvanian.

California—Standard Oil Co. of California No. 1 Roy Eaton et al, section 11-4n-29w, Santa Barbara County, flowed 2,226,000 cu. ft. of gas per day through 74/64-in. choke. Plugged back depth is 3,450 ft. The discovery is 2 mi. northeast of Elwood field.

West Texas—Drilling & Exploration Co., R. E. Aldrich, and E. P. Munson No. 1 P. L. Fuller, section 707, block 97, H&TC survey, Kent County, flowed 363 b/d of 40.2-gravity oil through 16/64-in. choke and perforations at 6,837-47 ft. in the Canyon reef (Pennsylvanian). The well is 1 mi. east of Cogdell Canyon reef field, but the pay in the new well is below that field's watertable.

New Mexico—Skelly Oil Co. No. 1-E Farming, section 2-24n-6w, Rio Arriba County, was completed as a Dakota gas discovery, flowing 3,050,000 cu. ft. daily through 24/64-in. choke and perforations at 6,924-75 ft. The discovery is less than a mile west of Pictured Cliffs gas production in Largo Canyon field.

North Texas—Bobby M. Burns No. 1 Schomoker, section 17, block 10, H&TC survey, Wilbarger County, was completed for 193 b/d of 52-gravity oil through 16/64-in. choke and perforations at 7,034-40 ft. The Pennsylvanian conglomerate discovery is 2 mi. northwest of Tolbert field, but nearest comparable production is 7 mi. west, in West Fargo Strawn conglomerate field.

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What the Business Snapback Means to Oil: I

Industrial production is moving up fast—faster than anyone thought it would in the first stage of the business recovery. And this promises to affect the whole picture of oil industry supply and demand. The upturn in industrial activity will soon hit the oil companies in two ways:

(1) Higher rates of activity by steel mills, power plants, and other users of heavy fuel oil mean a stronger demand for this fuel in the several months just ahead.

(2) Looking farther ahead, the rise in industrial production will bring renewed pressure on costs throughout all industry, as plants work closer to capacity. This could mean another cost-price squeeze on the oil industry, perhaps some time next year.

This week we'll take a look at the business upswing and its short-run effects on the demand for residual fuel. In our next "Trend of Business," we'll take a longer look at the chances that this business upturn will result in more cost inflation.

* * * *

The upswing in general business started from a recession low-point in April, using the Federal Reserve Board's index as a measure. In terms of quarterly averages, the second quarter of 1958 was the bottom (chart). At that point, most industrial firms were cutting inventories with a vengeance.

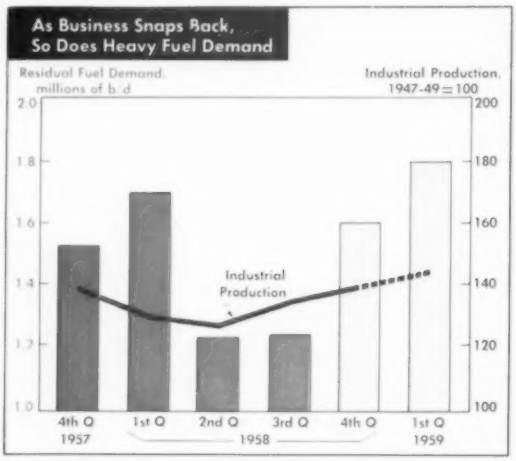
Most of this inventory slashing was completed some time in the third quarter. So, although summer is usually a slack time for industry, this year we had the unusual spectacle of a summer rebound. And industrial output is continuing to show rapid gains in the fourth quarter.

Inventory shifts account for most of this rebound—just as they accounted for most of the recession early in the year. But a more lasting type of uptrend seems to be in the making. In recent months, important industries like defense, machinery, autos, appliances, and textiles have scheduled higher output. And these industries are all basic lines—not just inventory swingers. They all point to the possibility of a higher demand in 1959.

How far will the upturn carry? By all signs, this is a major business cycle recovery—which means it could carry well into 1960, and exceed the old high for industrial production by a substantial margin. Many economists believe the Federal Reserve index of industrial output will be over 150 by the end of next year.

* * * *

But it's not necessary to look that far ahead in order to see an effect on oil markets. The demand for residual fuel is bound to be affected by the rise in industrial activity during the next six months. As it happens, these are winter months when there is also a good demand for heavy fuel for heating factories and other large buildings.



Take the rate of operations in the steel industry, which uses heavy oil in its furnaces. In April, steelmaking was at only 47% of capacity. Now it's around 75%, and may go over 80% by early 1959. Other industries are increasing their needs for fuel at a slower rate, but still significantly.

Such increases in fuel consumption—to power the industrial upturn—still haven't been fully reflected in the demand for fuel oil.

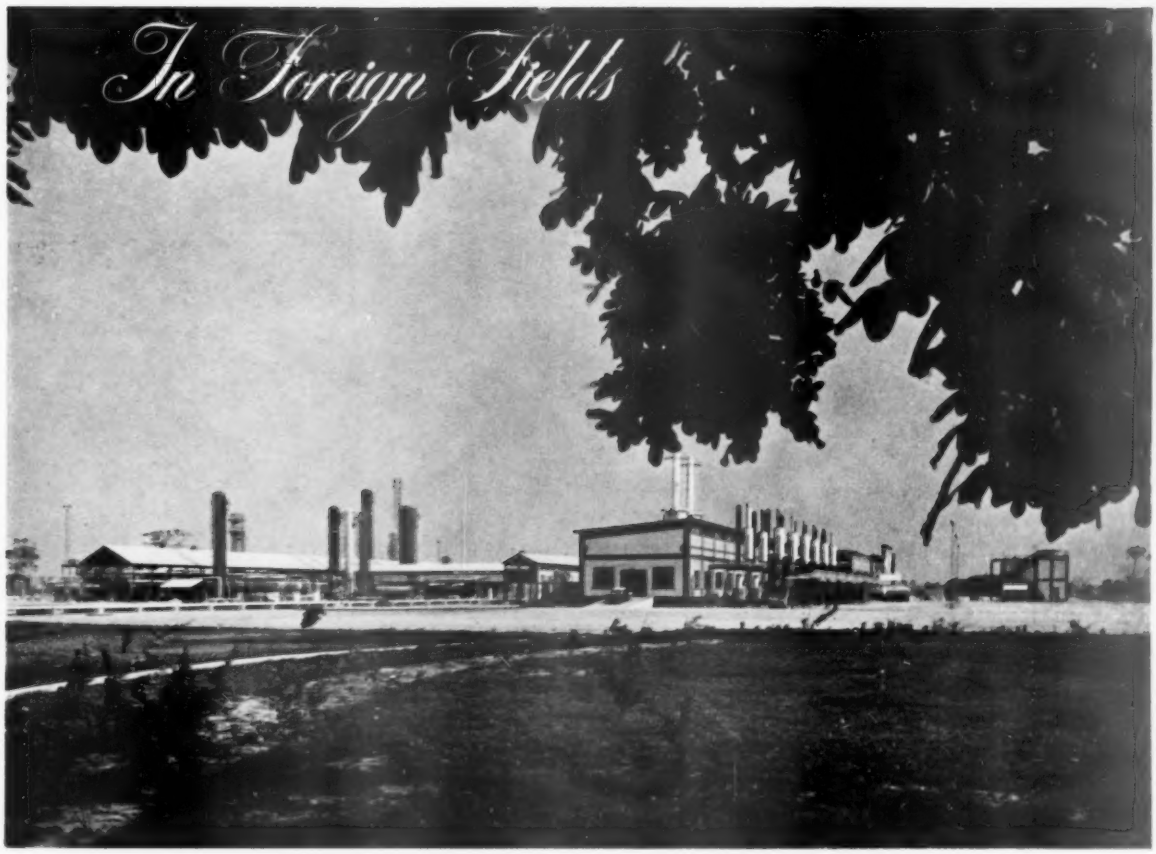
More and more natural gas is being utilized for industrial fuel and power. But some strengthening is already apparent in the demand for residual fuel, despite the competition from gas.

* * * *

The average monthly domestic demand for residual fuel reached its recession low of just over 1.2-million b/d in the 1958 second quarter (chart). That was 13.4% below the same quarter of 1957—the last pre-recession quarter.

But domestic demand in this year's third quarter rose 50,000 b/d over the preceding three months, to a level 2% above the same period of 1957. And it's a fair bet that fourth-quarter demand will average 1.6-million b/d, up 4.5% over a year ago.

With the general upturn continuing in 1959, average demand for heavy fuel next year could run 5% to 10% above the 1958 average. Right now, a preliminary estimate puts first-quarter domestic demand at about 1.8-million b/d, up 5.9% over this year's first three months.



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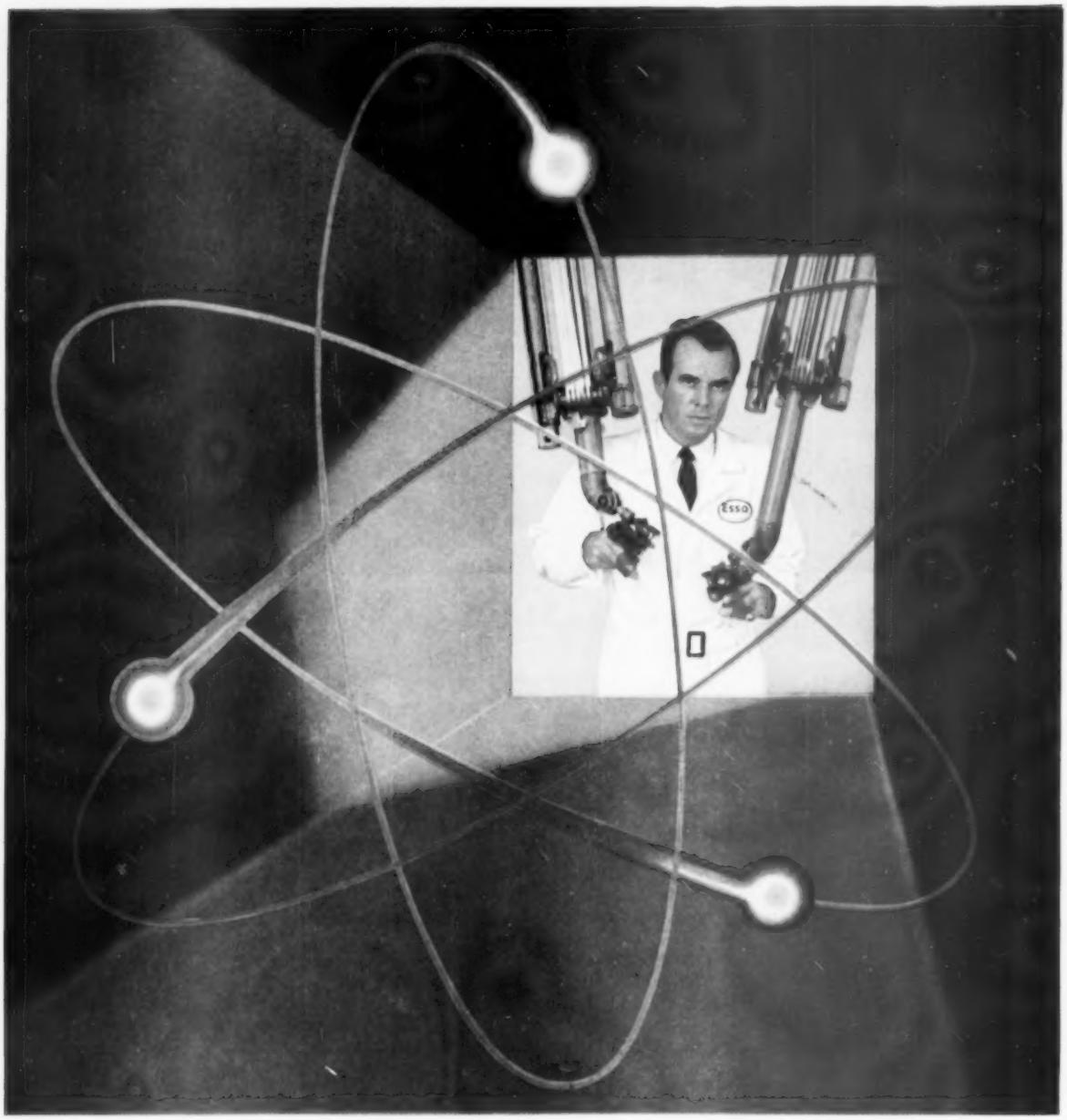

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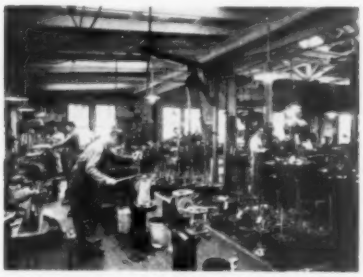
BEFORE (above): The reclamation shop and outside storage area were crammed into one acre at Socal's Richmond refinery.

AFTER (right): The new shop and storage area cover 15 acres—ample space to work, store, and grow in.



BEFORE (above): Working conditions in the old reclamation shop were crowded, with little flexibility to move and work in.

AFTER (right): Reclamation work efficiency has been improved by ample space, overhead cranes, and fluorescent lights.

Reclamation Shop Saves Time and Dollars

The new $200,000 reclamation plant at the Richmond (Calif.) refinery of Standard Oil Co. of California, Western Operations, Inc., incorporates everything the company has learned about reclamation since it began with a pipe-reconditioning plant at Taft, Calif., in 1933.

The Richmond reclamation operation began in 1936, when the company built an 800-sq. ft. structure, equipped it with one drill press and one lathe, and hired four mechanics.

Today, the Richmond operation consists of an 8,000-sq. ft. building housing a modern shop and laundry, an office building, two buildings for inside storage, and adequate yard space for outside sorting and storage.

The over-all reclamation setup, formerly crowded into an acre of space, is now located on 15 acres of newly filled San Francisco Bay land. The shop building is built on 70-ft. pilings, while the other buildings are on spread foundations. If more space is needed in the future, more fill can be added to the bay.

Socal's reclamation department has a three-fold job: dismantling obsolete plants, reclaiming usable materials, and selling those that cannot be used.

The company's purchase and stores department runs the reclamation plant as part of its responsibility for the supply cycle.

Most of the reclamation is reconditioning for shutdowns, and to replenish storehouse stocks, although the plant also reclaims many articles not carried in stock and which would be hard to obtain on short notice.

Much of the shop time is spent in reconditioning valves of all kinds, shapes, and complexities, including compressor valves. The shop handles 40 to 50 valves a day. Some work is also done on pipe fittings and small items, such as electrical fittings.

Most of the equipment in the new reclamation shop is standard, but some items were developed by the shop staff to fulfill special needs.

A travelling overhead crane can handle up to 2,000 lb. (sufficient for 99% of the shop's work) at any point in the shop. Heavier items are handled by a fork-lift truck.

Fluorescent fixtures provide 25 to 30 footcandles of light throughout the shop on a dark day. Daylight also filters through transluscent Fiberglas skylights. Steam heat and circulating air come from units mounted on the ceiling.

Some of the special tools developed

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by the reclamation group are: attachments to a drill press for resurfacing valve rings; a fast-operating rotary surface grinder for facing wedges; a seam-straightener; machinery for microfinishing and testing compressor valves; jigs and attachments for use on existing machinery to expedite "set-up" and reconditioning time.

A production flow-line plan is used to streamline operations and make maximum use of tools and facilities. Operating on a sequence basis, the production flow-line covers: (1) breakdown of material; (2) sandblasting; (3) complete repair and reconditioning; and (4) assembling, inspecting, and testing.

Formerly, one mechanic handled each reclamation job on a valve or fitting, from breakdown through repair and inspection. Now breakdown is just a training job preceding the rest of the reconditioning sequence.

After initial breakdown of the item to be reconditioned, it is sandblasted in a booth custom-made by the reclamation shop.

The sandblasting booth was made at the shop from parts of various commercial units, adapted to meet Richmond's particular needs. It is large enough so that materials-handling carts can be rolled inside, eliminating the need to lift material off of the carts to carry it into and out of the booth.

Blasting is by direct pressure, with the operator standing outside of the booth.

Pre-repair inspection, following the sandblast, is done by a top-grade mechanic, who works closely with the foreman. The mechanic is responsible for determining what to do with the item—whether it should be reconditioned or scrapped.

The mechanic outlines the work to be done in units, so that when it is reconditioned, the part will be equal to new.

Valves are completely reconditioned by whatever means are needed to make them workable again. When necessary, new seat rings are put in, wedges are built up and machined, trim is changed, flange facing is converted to raised face (small tongue or groove, whichever is required), and steel valves are equipped with a yoke bushing which has a 2,000F melting point.

If any welding is done, the valves are stress-relieved. Fittings are checked for "out of round," gauged, and machined or beveled, depending on the type of fitting.

After reassembly, the reclaimed item goes to a special test rack, to which it is secured by a quick-acting coupling made in the shop. The racks are equipped for hydrostatic-pressure tests up to 20,000 psi., air tests up to 125 psi., and steam tests if needed.

From the assembly and testing area, units are sent to the spray paint booth. Heavy items can be moved to the booth by the overhead crane.

The paint booth is adjacent to an outside door, so that finished units can be palletized and taken by fork-lift truck to the storehouse. Or they can be picked up by a regular truck for delivery.

Scrap-handling also received a major renovation at Socal's Richmond refinery. The new scrap setup has four times the storage space that was available in the old one.

Scrap includes rope; cupro-nickel, brass, and steel tubes; cast iron; and other metals. All scrap is sorted and graded to assure getting highest possible prices for it. It is then stored in labeled bins located near a railroad spur outside the shop. The increased storage area permits the company to hold scrap when advisable, and to sell in quantity lots.

A new shearing device, which will cut pipe of up to 6-in. diameter, facilitates scrap handling by reducing the need for torch cutting.

Another major part of the reclamation-area renovation was the installation of a modern laundry to clean protective clothing and filter materials.

Commercial laundries in the area cannot meet the required delivery time, and are generally adverse to handling rubber boots and rubbers, protective rubberized garments, and plastic gloves.

The new Socal laundry consists of a 350-lb.-capacity washer and a 165-lb.-capacity washer—each with two compartments, so that small lots can be handled—two extractors, and four driers.

A two-man crew can wash 4,000 lb. of material daily—compared to only 1,500 lb. daily in the old reclamation-plant laundry—and turn out a better job, besides. This facility is especially valuable during maintenance shutdowns, when it is necessary to provide clothing for crews working around the clock.

A "confetti maker," to dispose of confidential papers, is a novel installation at the Richmond reclamation shop.

The company does not burn paper, because of local smog regulations. Previously, sacked waste paper was sold to a nearby paper mill without

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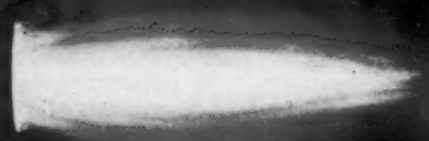

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further processing, so that it was necessary to witness destruction of the paper. But the mill no longer would take the paper in that form.

The Richmond confetti-maker will handle the 600 tons a year of used paper from both the refinery and the San Francisco headquarters office.

Boxes of files and sacked paper move into the mill on a conveyor belt, and the paper is cut into 1-in. squares by a set of steel bars rotating on a spindle powered by a 950-hp., 3,600-rpm., direct-drive motor. When the pieces of paper are small enough, they are blown through a screen into a baler, which packs the pieces into salable 450-lb. bales.

Reconditioned materials last year from four California reclamation plants operated by the company (at Richmond, Taft, LaHabra, and El Segundo) totaled $4,796,000 in replacement value. Richmond alone was responsible for about $1-million of this, as well as generating and processing about 6,000 tons of ferrous scrap a year.

While dollar-savings from reclamation and scrap sales are considerable, the real importance is in the reduction of refinery downtime and maintenance, according to Socal.

The company estimates that the reclamation shop saves thousands of dollars a year in downtime. Says Hardy Klarquist, manager of the company's purchase and stores department, "The dollars and cents you save in reclamation of materials are only indicators. A not-often-understood goal of reclamation is saving shutdown time. And time is the most expensive thing in this kind of operation."

Phosphorus Cuts Spark-Plug Misfiring

Spark-plug deposits, direct results of automotive engine design and operating conditions, can cause engine misfiring and significant loss of engine horsepower.

The trend toward more powerful and more efficient automotive engines has brought increases in compression ratios, greater engine-breathing capacity, and higher engine speeds. However, at the same time, extended metropolitan area growth and crowded highway conditions have increased the amount of low-speed driving, so that engines operate for long periods at small fractions of their rated output. This combination of conditions causes excessive fouling of spark plugs.

The first symptom of spark-plug fouling—misfiring—is caused by electrical leakage through the spark plug.

Carbonaceous lead-containing deposits on the ceramic insulator surfaces of the spark plug reduce the electrical-leak resistance of the plug by conducting electricity between the central electrode and the metallic casing of the plug. When the electrical-leak resistance of the spark plug drops below one megohm (1-million ohms), the plug is likely to misfire, according to a report given at the recent Tulsa meeting of the Society of Automotive Engineers by J. L. Lauer, P. J. Friel, and R. D. Miller, of Sun Oil Co.

A second effect of spark-plug fouling sometimes seen in the lab is an increased octane requirement for engines.

When new plugs were substituted for old ones in the Sun Oil tests, the engine's requirement would decline up to three octane numbers. However, this effect was found much more frequently in laboratory engines than in cars being road-tested, the Sun men reported.

One possible explanation for the lack of correlation between laboratory and road tests could be the greater prevalence of preignition from hot combustion-chamber deposits during road tests, thus partially compensating for the failure of badly fouled spark plugs to ignite fuel-air mixtures.

Phosphorus additives in the gasoline reduce spark-plug misfiring by changing the character of the spark-plug deposits, according to the Sun Oil work.

The advantage of using phosphorus-containing fuel additives for motor gasolines seems to lie chiefly in the lower electrical conductivity of the lead-phosphorus compounds as compared to the lead-chlorine and the lead-bromine compounds normally found on spark plugs.

It is the high electrical conductivity of the lead halides (lead combined with chlorine or bromine) that is the main cause of spark plug misfiring.

However, in fuels using phosphorus-containing additives, the phosphorus replaces the chlorine or bromine in the deposit.

Another possible solution to spark plug misfiring is to operate the plug at higher temperatures, according to the Sun Oil researchers.

The more highly electrically conductive deposits found on spark plugs tend to be on the cooler areas of the plug. The deposit on the base zone of the spark plug (which operates at about 212F to 250F) is mainly a highly conductive mixture of the mixed chlorine-bromine compound of lead ($PbClBr$), with some lead oxyhalide ($PbO \cdot PbClBr$).

Deposits around the hotter central electrode of the spark plug (which operates at about 600F to 700F) are much less conductive. While they contain some lead oxyhalide, they also contain such less conductive compounds as lead oxide (PbO), lead oxysulfate ($PbO \cdot PbSO_4$), and, if phosphorus is present in the fuel, a complex lead bromophosphate ($3Pb_3(PO_4)_2 \cdot PbBr_2$).

Fuel composition also affects the type of spark-plug deposits formed.

High-boiling fuel constituents (such as heavy aromatics from cat reforming) keep the conductive lead deposits dispersed on the plug and cut down on the electrical conductivity of the deposits.

However, it is difficult for the refiner to exploit this measure, as the use of heavy ends in fuels has undersirable side effects (increased engine deposits, surface ignition, and higher octane requirements).

Another way to control spark-plug deposits could be a higher air-fuel ratio in the engine.

The Sun Oil experiments indicated that heating a spark plug in an oxygen atmosphere for one hour at 400F doubled the electrical resistance of an already-fouled spark plug. When heated for the same length of time at 400F in nitrogen, the resistance of the plug did not change significantly.

How Spark-Plug Fouling Cuts Engine Horsepower

Test Fuel	Horsepower Loss Caused by Spark-Plug Fouling	Plug Resistance (billions of ohms, at 400F, in nitrogen)
A	23.2	1.2
B (with phosphorus)	4.6	41.3
C (with phosphorus)	6.2	35.5
D (with phosphorus)	8.6	17.5
E	10.4	11.5

ESSO OCTANE CAPACITY INCREASE

. . . more high octane gasoline

A new 26,900 barrels per day Powerformer is now in operation at Esso Standard Oil Company's Baton Rouge Refinery—largest in the United States.

The new unit increases significantly the refinery's capacity for producing high octane gasolines needed for the increasingly efficient automobile engines now being manufactured.

Powerforming is a new, improved process using platinum-base catalyst developed by Esso Research and Engineering Company. Construction of the unit was one of two major projects completed in July at Esso's Baton Rouge Refinery. The other was an expansion of a Debutanizer and Splitter Unit to provide additional fractionating facilities for handling naphtha and light ends.

Esso entrusted mechanical design and construction of both projects to the Bechtel organization.

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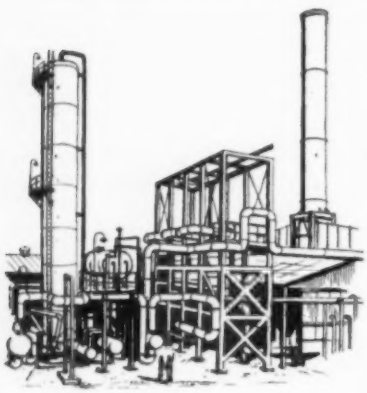

Daikyo Oil Company, Ltd.
Yokkaichi, Japan

The Daikyo Oil Company, operator since 1955 of the first HOUDRIFLOW catalytic cracker in the Orient, now has a HOUDRIFORMER on stream, with a nominal design capacity of 3,000 BPSD. This unit, which uses Houdry platinum reforming catalyst, produces high-octane gasoline from the high-paraffin, high sulfur naphthas derived from Arabian and other Middle East crudes.

Other petroleum refiners in the U.S. and abroad have gained maximum economy and flexibility for their refining operations through HOUDRIFORMING. You may too. Complete information available from:

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**Houdry means Progress . . . through Catalysis*

What's New / IN PROCESSING

The U.S. Interior Dept. has awarded Fluor Corp., Ltd., a contract to build a helium extraction plant in the Keyes field, Cimarron County, Okla. (PW—Nov.7'58,p104).

The contract, on a cost-plus-fixed-fee basis, provides $700,000 for Fluor and calls for work to start immediately. The basic plant costs under the contract are estimated at $8.9-million, with land and certain additions to the plant to be handled separately. About $12-million is available altogether for the construction of this plant.

•

Enjay Co., Inc., plans construction of a 30,000-sq. ft. plastics wing as an addition to its customer-service research labs at Linden, N.J.

The wing will be essentially a plastic-products fabricating plant in miniature. It will have commercial-type production equipment—including injection molders, extruders, and formers. Other facilities will include a mixing and compounding lab, a weighing room, chemical-analysis and physical-testing labs, offices, and a conference room.

Completion of the facility is planned before next fall. The construction contract has been awarded to Calabro Construction Co., Rahway, N.J.

•

Royalite Oil Co., Ltd., has completed arrangements to continue Athabasca tar sands operations in Northern Alberta in conjunction with "a major oil company" (not identified).

•

An index of all chemical and petrochemical patents issued by the U.S. Patent Office during the years 1950 to 1954 is now in preparation.

The project is being undertaken by Information for Industry, 1000 Connecticut Ave. NW, Washington, D.C. The same group has been supplying annual indexes on these patent subjects.

•

Westcoast Transmission Co., Ltd., has received permission from the Alberta government to purchase land just west of Coleman to build a gas processing plant.

The company estimates the cost of the plant at around $15-million. Construction will not be started until Westcoast receives a permit to export Alberta gas.

•

Man-made rubber will be available to supply a large share of the world's total new rubber needs within three years, according to J. Ward Keener, president and chief executive officer of B. F. Goodrich Co.

World consumption of new synthetic rubber in 1958, outside Soviet countries, will total nearly 1¼-million long tons—more than double the figure of ten years ago and 40% above that of five years ago. During 1958, the U.S. will use synthetic rubber to supply 64½% of total new rubber use, and the rest of the Free World will consume about 360,000 long tons of synthetic rubber (about 25½% of total new rubber needs).

In 1959, Keener says, synthetic rubber consumption will nearly double that of natural rubber, and consumption in the rest of the Free World will increase more than 15% over 1958.

•

Alaska-Yukon Refiners & Distributors, Ltd., has awarded contracts for a product separation and treating plant and a marine terminal.

The total value of the work is about $1-million. Fluor Corp. of Canada, Ltd., is the contractor. The 3,000 b/d plant will be located at Haines Junction, Yukon Territory, Canada. The terminal will be at Valdez, Alaska.

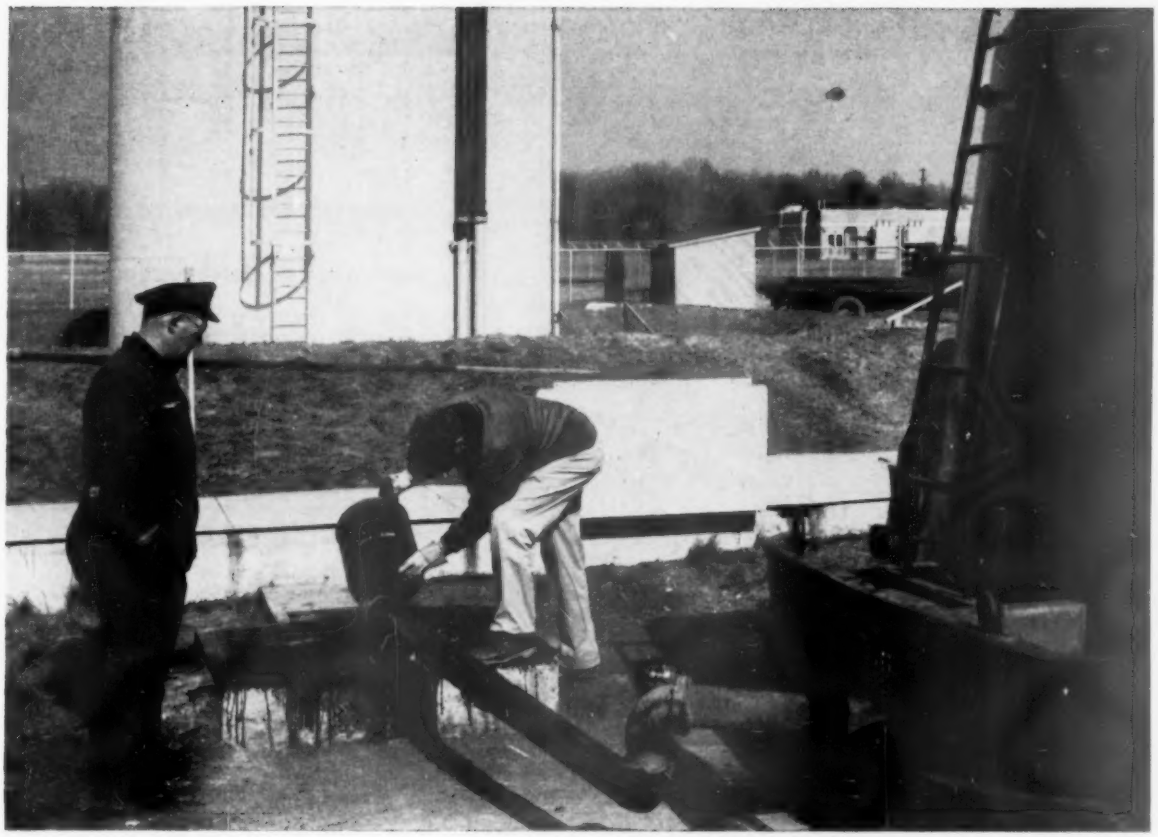
Engineering and design work is now proceeding, and site survey and selection has been completed. Project completion is scheduled for the spring of 1959.

•

The daily average production of natural gas liquids in August was 33.2-million gal., 1% greater than a year ago, according to the Bureau of Mines.

The daily average production of liquefied gases at refineries was 6.6-million gal., 9% greater than a year ago.

The demand for liquefied gases for fuel and chemical uses in August was 6% higher than for August, 1957. The daily average demand for natural gasoline was 12.4-million gal., down 8% from August 1957.

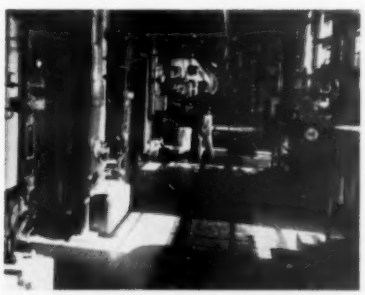


Du Pont FOA-2 is added to residual fuel as it's pumped into sludge-ridden tank.

$20 worth of FOA-2 saved $800 desludging job ... and with no downtime

A power plant serving two industrial laboratories burns between 1,000 and 1,500 gallons of residual fuel, daily, from a 50,000-gallon tank.

Recently, it was discovered that six inches of sludge had accumulated in the bottom of the tank. Constant temperature had to be maintained in the laboratories, so a tank-cleaning firm was called in. They gave a firm estimate of $800 for cleaning the tank mechanically. Considerable downtime would be required.



This is the powerhouse that *had* to maintain service, so that essential temperature control, in the laboratories it served, could also be maintained.

Looking for an alternative, the power superintendent decided to try using Du Pont Fuel Oil Additive No. 2 to break down the sludge. After one week of operation, during which only $20 worth of FOA-2 was used, no sludge could be detected. Moreover, there was no downtime. *The tank was in use all during the clean-up period.* Boiler room operations were completely trouble-free throughout the time the sludge was being dispersed and burned with the oil.

In addition to sludge removal, prevention of sludge is an improvement FOA-2 gives residual fuels. It is an excellent stabilizer, solubilizer, and dispersant.

Being nonmetallic, the additive burns with the fuel, leaving neither ash nor other residue. Refiners as well as their customers profit from the use of FOA-2, because it helps to stabilize all forms of distillate fuel oils, as well as residual fuel. These include blends such as catalytic-cracked stocks combined with straight-run products.

Your Du Pont representative can give you further details. Or write for a copy of our comprehensive 24-page FOA-2 book. It contains complete technical and experimental data. E. I. DU PONT DE NEMOURS & CO. (INC.), Petroleum Chemicals Division, Wilmington 98, Delaware.

See the "DU PONT SHOW OF THE MONTH" on CBS

DU PONT

Better Things for Better Living
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and other
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Through new radiation techniques and dozens of others, oil men are using research as a tool to process oil better, to create new products, and to find and produce more crude—all for less time and money.

50 Research Men Talking

Contributors to this report are more than 50 oil scientists and engineers, most of them executives with research affiliates or research departments of large oil companies. Others are operations men serving on research advisory committees—or officials with independent oil companies, research institutes, and equipment and supply firms. The men were contacted in all parts of the country, mostly by personal interview.

RADIATION lab at Esso Research Center, Linden, N.J.

Oil Companies Willing to Spend To Make Money with Research

Oil management apparently is convinced that cutting back research expenditures is like cutting an artery. Despite the recession, a fair number of oil companies actually increased their research budgets for 1958.

The Jersey Standard group, which makes the largest research appropriation in the industry, is topping the record expenditure of $55½-million it made in 1957. Other examples:

- Sun Oil Co. is spending $5-million in product and process research alone this year, a gain over 1957.
- A midwestern major says its research spending this year is "about 20% higher than last year."
- A big oil company headquartered in the East is spending $3.5-million in research operating expenses this year, compared with only $2.6-million in 1957. And the company's research affiliate is requesting a further boost to $5-million for 1959.
- A large well-service firm says that this year it has "cut everywhere except in research." The company has retained all its research manpower, and will spend $5-million to $6-million in 1958.

A top oil executive explains such higher budgets this way, "There is a business philosophy involved. Research projects are all based on an attempt to protect investment capital. The more you have invested, the more you need research. As companies grow, so must their research efforts."

Almost as impressive as the research increases this year is the large number of oil companies that are maintaining their level of expenditure in the face of skidding profits.

Indiana Standard 1958's consolidated appropriation is "essentially the same" as the $24-million spent in 1957. Shell Development Co.'s exploration and production research division, in Houston, is maintaining a budget of about $6-million in 1958, and expects to spend about the same amount next year.

A southwestern major has a total research and development budget of $4.1-million, and plans "about the same expenditure during 1959."

There's a philosophy here, too. Says an oil research chief, "It has been our policy to try to dampen the ups and downs of the business cycle by holding our research budget steady when times are bad, as recently. We increase the budget slowly when conditions improve. We try to avoid big cyclical swings, so we don't have to make any serious cutbacks when business conditions sag."

There has been a tremendous postwar expansion in oil research spending. Some big oil companies have more than doubled their research efforts since the war.

In 1947, for example, California Research Corp. (Standard of California affiliate) spent $5-million. In 1957, the total spent by the company was more than $16-million.

Indiana Standard's consolidated research totals have climbed from year to year like this: 1953, $17-million; 1954, $19-million; 1955, $20-million; 1956, $21-million; 1957 and 1958, $24-million.

Another large major shows this trend: 1947, $8.8-million; 1956, $17.8-million; 1957, $19.9-million; 1958 and 1959, $21-million.

The largest piece of the research budget is going to the processing segment of the industry. Says a top-ranking oil researcher in exploration and production, "In total research, it is true that manufacturing is getting the most attention. It's partly related to the ease with which you can evaluate this type of research. With a new chemical, it is obvious that if you hadn't discovered it, you wouldn't have it. You can assign the money you make from that chemical to that research.

"It is more difficult to show the importance of any particular exploration or production research. And this is related to the difficulty of finding raw materials. If not enough oil were being discovered, exploration and research activity would increase."

Adds the research head of one of the top ten majors, "Most of our research attention, dollarwise, is devoted to processing and improvement of our light products—gasoline and fuel oil. Percentagewise, our expenditures on processing and improvement of fuels run about 35% of our total research budget. Research in exploration, drilling, and production runs about 25%.

Esso Research & Engineering Co. estimates that the oil industry will spend $94-million this year on processing pilot-plant research alone (with an additional $82-million being spent by the chemical industry).

California Research Corp. feels that the industry's research investment is most justified by efforts to attain optimum distribution of products from each barrel of crude, and to improve efficiency of finding and recovering crude oil.

Battelle Memorial Institute, Columbus, Ohio, which does a lot of work for oil companies, gives what it calls an "outsider's" view of oil's research problems, which generally agrees with the Cal Research position:

"The three basic research needs, as our people see them are: (1) getting the maximum economic values from each barrel of crude through optimum production of gasoline, petrochemicals, and other products—consistent with the needs of the market and investments in capital plant; (2) finding and producing more oil at lower cost; and (3) directly detecting the presence of crude oil, rather than merely the geological formations favorable to oil.

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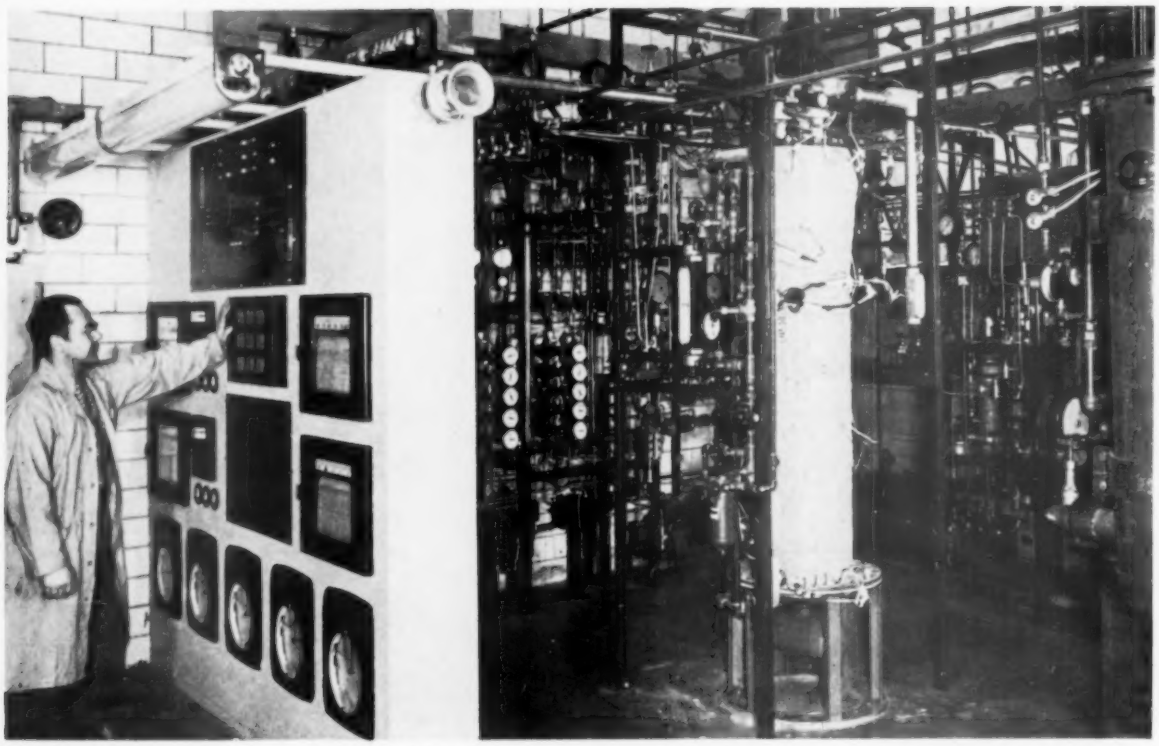
SPECIAL REPORT



AUTOMATIC PILOT PLANT, used by Indiana Standard to study catalyst behavior, brings researchers closer to the big . . .

Goal: Squeezing Full Value from Crude

Higher octanes at lower cost is the big target. But all phases of processing are getting close study. Use of radiation grows.

Refiners are talking to themselves more and more about the high cost of making higher octanes. And with the top of the hill still not in sight, oil companies are trying hard to find the answer to the premium-gasoline cost problem in the research labs.

Several big companies are on record as saying that any further rise in gasoline octanes will not give enough additional efficiency in the internal combustion engine to make up for the extra cost. (California Research Corp.'s cost figures appeared in PW—Aug.22'58,p34.)

One top-ranking research executive thinks oil companies have only themselves to blame for the octane squeeze. "Some petroleum people," he says, "get very excited about what the Detroit people do. But part of the time it's the other way around. Let one refiner jump his octane, then all the rest do it, and Detroit hops in with a car that will require it. Some of the octane trouble of the industry is a rather childish 'keeping up with the Joneses,' fostered upon unsuspecting businessmen by advertising enthusiasts so devoid of imagination that they have to fall back on the big numbers—high octanes."

Several other sources place the blame mainly on the auto makers, insisting that oil companies have no choice but to build higher octanes to meet the needs of higher-compression engines.

A Midwest major believes that gasoline octanes will continue to climb for another three to five years, with yield probably continuing to suffer. The company is carefully studying all process developments that will help keep costs down.

Many of the companies feel the main effort should be toward improvement in catalytic processing, the mainstay of refiners for making motor fuels. Says a research manager in the East, "Very little virgin, or unconverted, material now ends up in motor fuels. New and better processes are needed, and are being looked for, in addition to the studies to improve catalytic processing itself."

A tough problem for research to handle is the trend toward "chemical" processing in refineries. Sharper separations are being made to segregate and recover specific chemical compounds or groups of compounds

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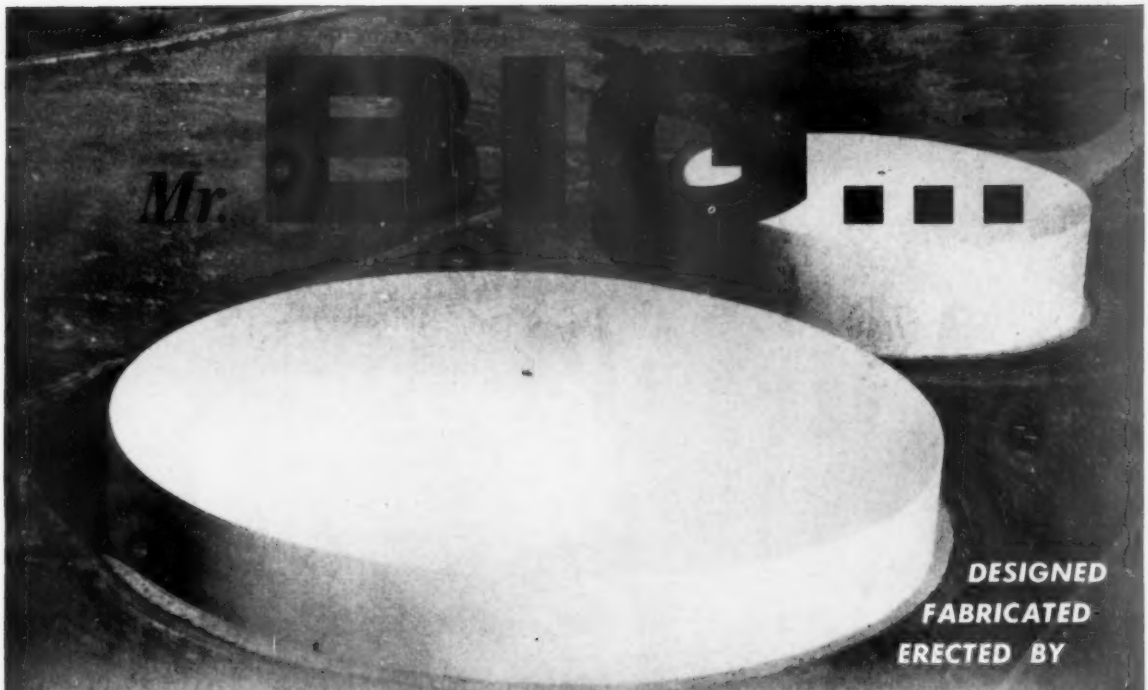

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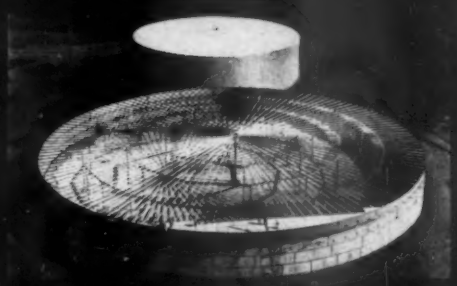

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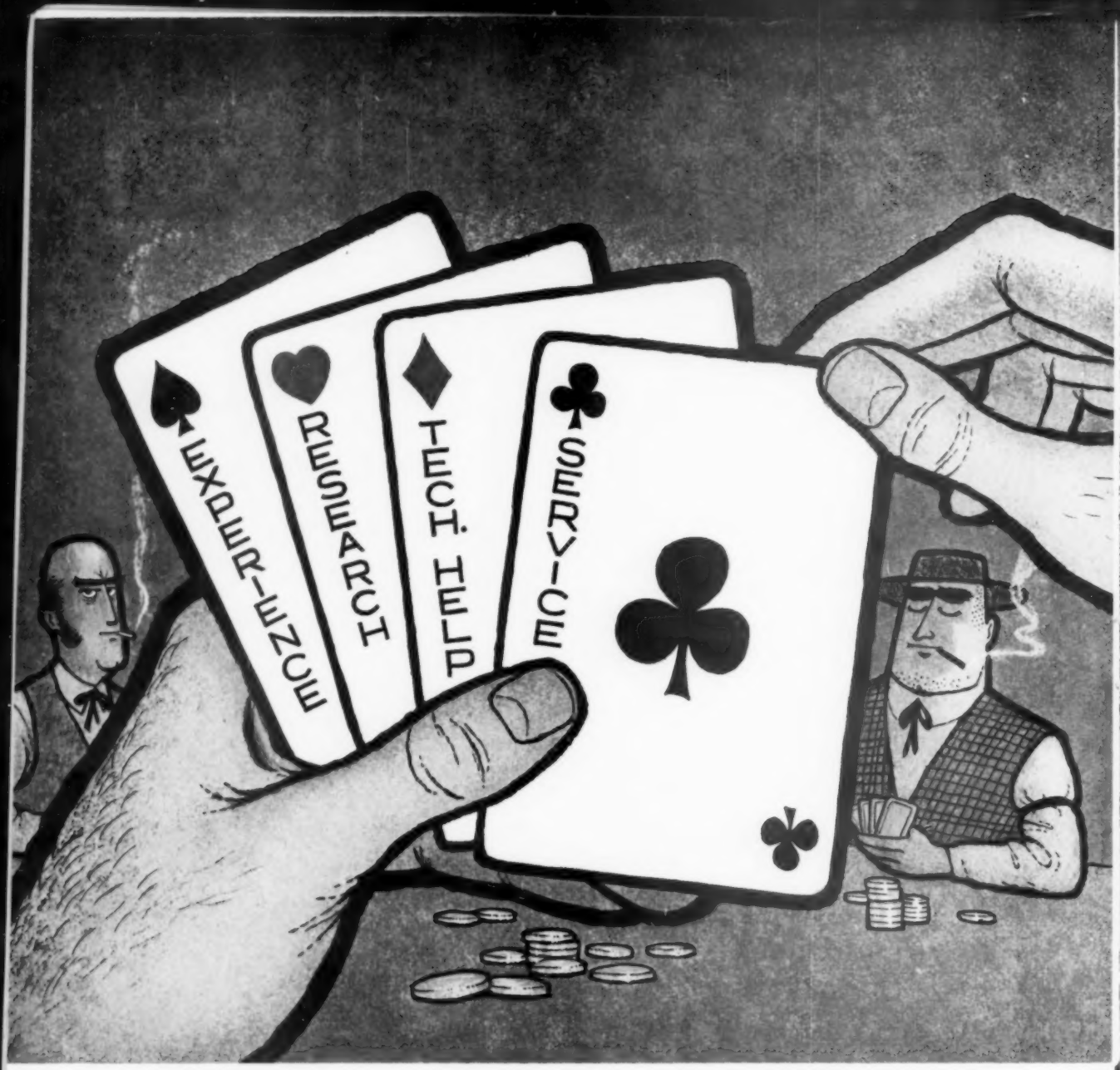

In the catalyst game
Davison deals you the winning hand

The game of *catalysts* is different from poker, in that it doesn't depend on luck. You've got to have the cards, or you can't make out. Davison *has* the four winning cards to deal you (count 'em!): ♠Experience, based on year-in, year-out production of quality catalysts; ♥Basic research, at our new, thoroughly staffed and equipped Grace Research Center at Clarksville, Md.; ♦Technical assistance when you need it, from a seasoned, competent staff of technical advisers; ♣Quick service from *four* Davison plants conveniently located to deliver catalysts where, and *when*, you need them. So, if you're interested in catalysts, try Davison. They'll deal *you* a winning hand every time!

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from gasoline cuts. Chiefly, this means separating out the high-octane materials for use in gasoline—and recycling the octane-poor materials through further processing, to make them into higher-octane materials also.

Conventional distillation, as a means of separating the components of a liquid mixture, is expensive. And it will not work at all in the case of some close-boiling and constant-boiling mixtures.

Some researchers are convinced that the Linde Co.'s "molecular sieves" are the coming thing for making chemical separations (PW—Sep.12'58,p33). Several big oil and refinery service companies are working with the sieves. "They work all right," says a major's research chief. "The problem is getting them into commercial applications."

The sieves are made of a hard, porous material. In theory, a straight-chain hydrocarbon will slip through the pores, while a branch-chained hydrocarbon cannot "get through the door." This separates the two kinds of hydrocarbons—usually a difficult job by distillation. The sieves can also separate paraffins and aromatics, and paraffins of different molecular sizes.

Because the pores may be tailored for different sizes, they can make many chemical separations not feasible, or too costly, with distillation. Expensive distillation towers are unnecessary when the sieves are used.

Other researchers have their reservations. They say that petroleum hydrocarbons are usually such a hodgepodge of chemical types (paraffins, olefins, iso-olefins, cyclics, aromatics, etc.) that there is not the simple job of merely separating one chemical from another, but of working with the complex mixture and still getting what you want.

Comments one researcher, "The sieves are not a panacea, and work remains to be done to lower costs."

Hydrogen processing is another technique getting close study. The emphasis here is on finding better ways to convert residual fuel to a more valuable product. Among the companies actively researching hydrocracking to achieve this purpose are Gulf, Humble, Esso Standard, and Esso Research.

One of the refinery service firms is "very active" in laboratory work on evaluating hydrodesulfurization, hydroisomerization, and hydrogenation. The company says "the field is very alive."

The problem of energy-recovery around the refinery is another of dozens of priority projects. Much heat energy is lost in hot flue gases. Also, hot process streams cool when sent to intermediate storage, and must be heated before entering the next processing stage. This is leading to new refinery designs that have reduced intermediate storage. The use of carbon monoxide boilers is another increasingly popular way to conserve manufacturing heat values.

Dozens of pilot plants are being used at oil research centers to improve existing processes and find new ones. Among those especially active in this work are California Research, Esso Research, Indiana Standard, Tidewater, Universal Oil Products, Houdry, and others.

Tidewater, with by no means the largest number, has such pilot plants as these in operation: fluid catalytic cracker to study feed stocks and process variables; a second

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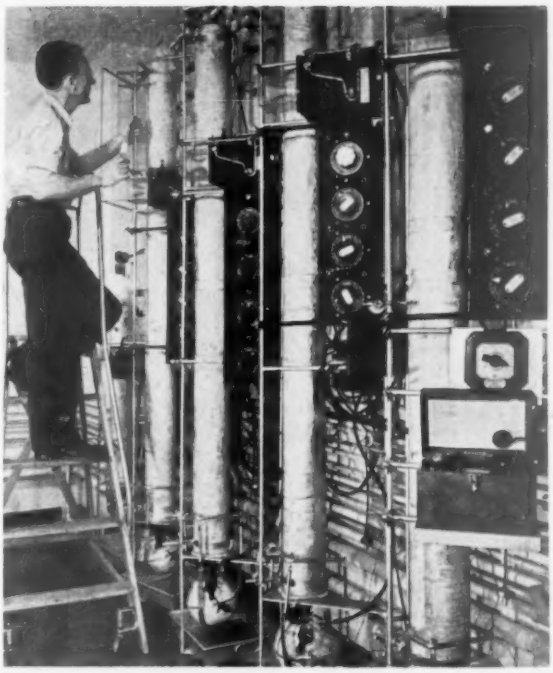
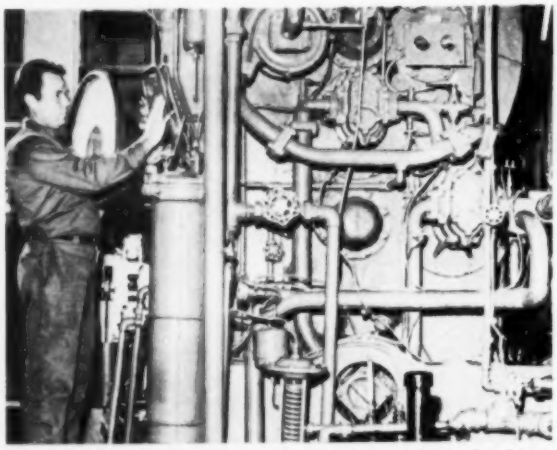


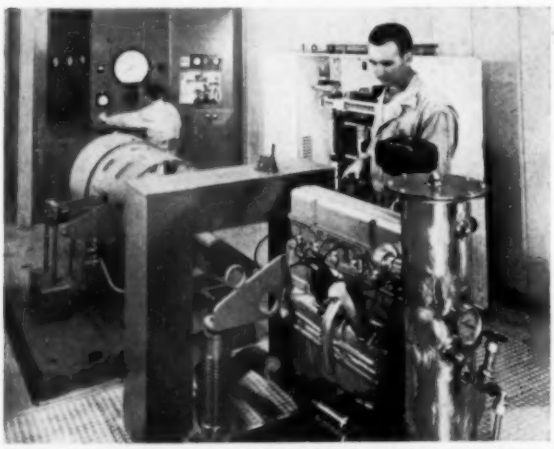
PROCESS RESEARCH is getting heavy emphasis. Distillation process study is continuous at California Research Corp. (above). Esso Research is one of many companies using pilot plants (below) to develop new refining processes.

SPECIAL REPORT
RESEARCH

VISCOSIMETER in engines, fuels, and lubricants lab of Southwest Research Institute determines lube oil viscosity.



DIESEL LOCOMOTIVE engine is being used by Southwest Research Institute to evaluate light and heavy fuel oils.



ENGINE TEST CELL at Richfield Oil Corp.'s Research Center, Anaheim, Calif., evaluates fuels at 80-mph. engine speeds.

fluidized fixed-bed cat cracker, used for aging of catalysts and study of catalytic poisons; hydrodesulfurizer and catalytic reformer (twin units); two solvent extraction plants; a fluid coking plant; plus atomospheric and vacuum stills. The latter are completely instrumented and used to evaluate distillates of crudes and to provide data for the company's electronic computer group. Most of the pilot plants are controlled by instruments, and some are capable of completely automatic operations.

Radiation Moves In

Oil companies are moving steadily closer to their goal of using radiation to process crude oil and chemicals. Nuclear reactors can already be used for this purpose, and can produce products in commercial quantities, according to scientists with Esso Research & Engineering Co. They reported recently that the synthetic isotope, cobalt-60, can be used as a radiation source in small processing units at practical prices.

The cheapest source of radiation, the Esso Research team says, is a nuclear reactor. But this is feasible only with large capacities. For medium-sized operations, the electron accelerators are cheaper than cobalt-60.

The Esso Research men say that radiation may be able to reduce the degree of temperature and pressure needed, to augment or replace catalysts, and to improve quality. But they add that more research is necessary to show which processes can use radiation competitively with present methods.

Esso Research has also been experimenting with radiation to treat lube oils. The process reportedly avoids some of the unwanted byproducts yielded by the sulfuric acid treatment.

In another Esso Research process, which uses cobalt-60, gamma rays cause a reaction of sulfur dioxide and oxygen with liquid paraffins, giving new classes of detergents. The gamma radiation does not spread to other objects, so there is no danger of product contamination.

Esso Research says the method, called sulfoxidation, could become "an attractive method for manufacturing new classes of both oil- and water-soluble detergents—including motor oil additives."

Also, Atomic Energy Commissioner Dr. W. F. Libby reported recently, "Stimulating research studies have shown that radiation can crack crude oil to form gasoline, can inhibit gum formation in stored petroleum products, and, by grafting side chains to straight-chain hydrocarbons, can increase octane ratings."

The oil scientists are running into some roadblocks with radiation. One major's radiation lab was built on the premise that the combination of heat, plus catalyst, plus radiation, and maybe pressure, could do things that can't be done without radiation. To date, most of the results have been inconclusive or discouraging, although the lab has one lead that shows promise.

Southwest Research Institute, San Antonio, has under way a fundamental research study designed to evaluate the effect of radiation in starting reactions in hydrocarbon systems. The study will cover radiation of both naphthenic and aromatic crudes, and distillation cuts from the crudes

continued ▸

PRODUCTION ECONOMY BEGINS WITH EFFICIENT TREATING

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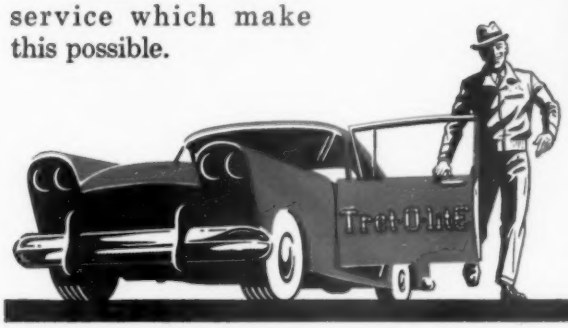
The right chemical, correctly proportioned ***HERE***

. . . With low cuts at minimum treating cost, as indicated ***HERE***

. . . Result in a favorable sample ***HERE***

. . . And lead to accepted tanks, every time, as shown ***HERE***

Your Tretolite service engineer, "the Man in the Red Car", provides the chemicals and the service which make this possible.



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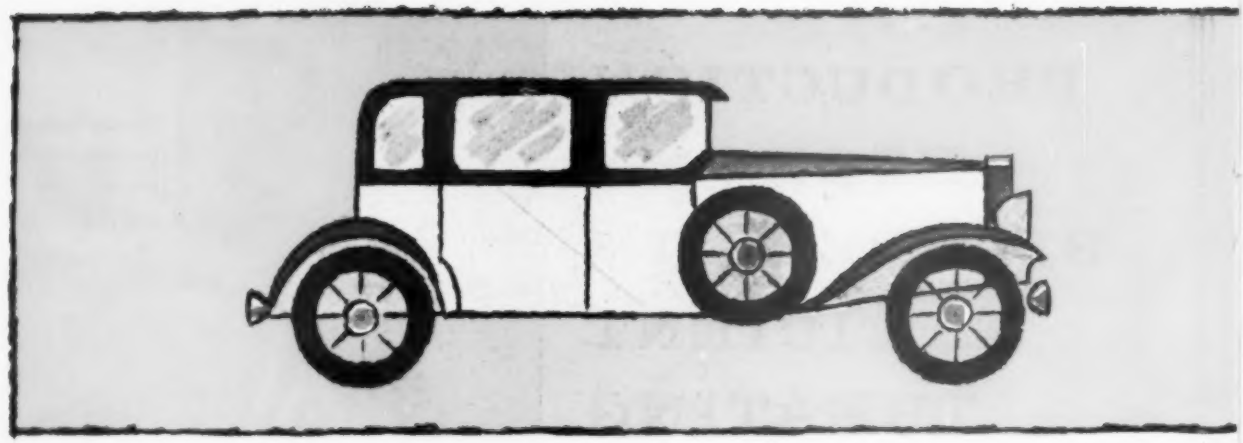
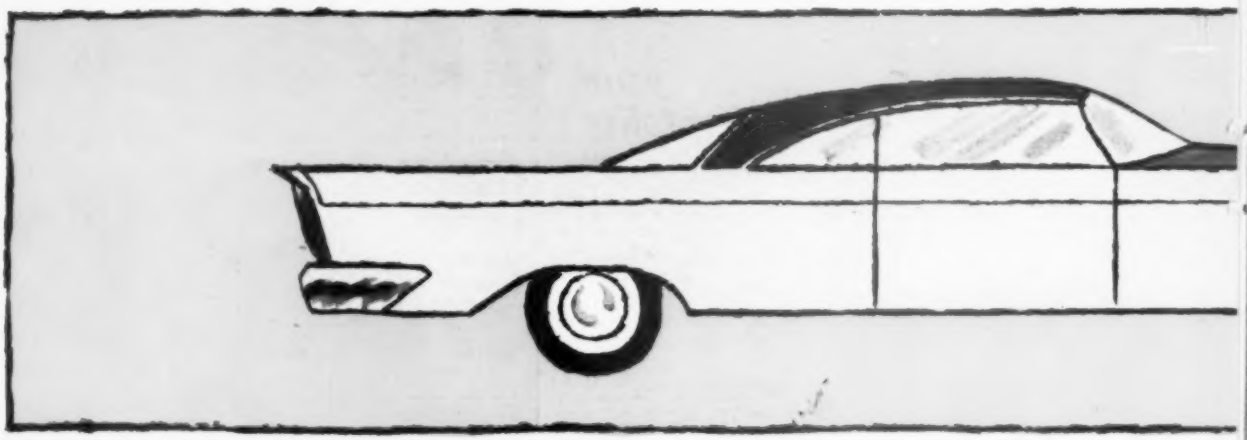




Telling the story of

One gallon of today's gasoline moves one ton of automobile eighteen miles farther than a gallon of gasoline did in 1930.

Yet the gasoline cost per ton-mile (excluding taxes) is eighteen percent less today.

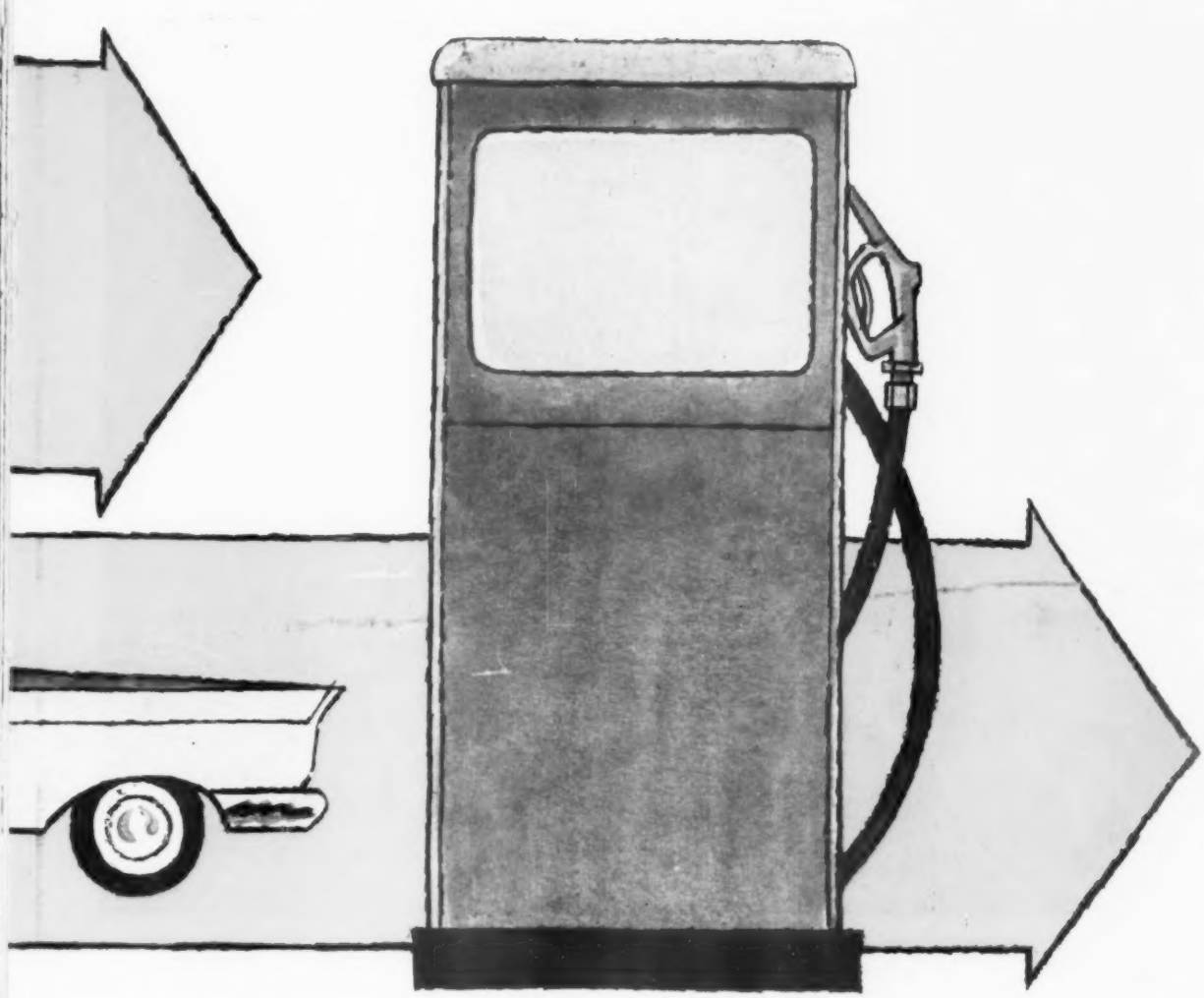
This is the story of gasoline progress . . . a story that needs to be told.

The public is not aware of the great improvement in gasoline quality and what it means to them in terms of more economical transportation. They do not realize that improvement in engine design is dependent on the widespread availability of high quality gasoline.

To determine the facts, Ethyl made a study of the ability of modern gasoline to do more work. These findings were then related to published prices at service stations. This study is fully documented and is available to the Industry.

To explain the value of modern gasoline to employees, dealers, and the public, the study has been put into simplified magazine and newspaper articles, a picture book, and a visual presentation.

Promoting this concept of gasoline progress is part of Ethyl's continuing effort to build public understanding of the Oil Industry's contribution to better, more economical transportation.

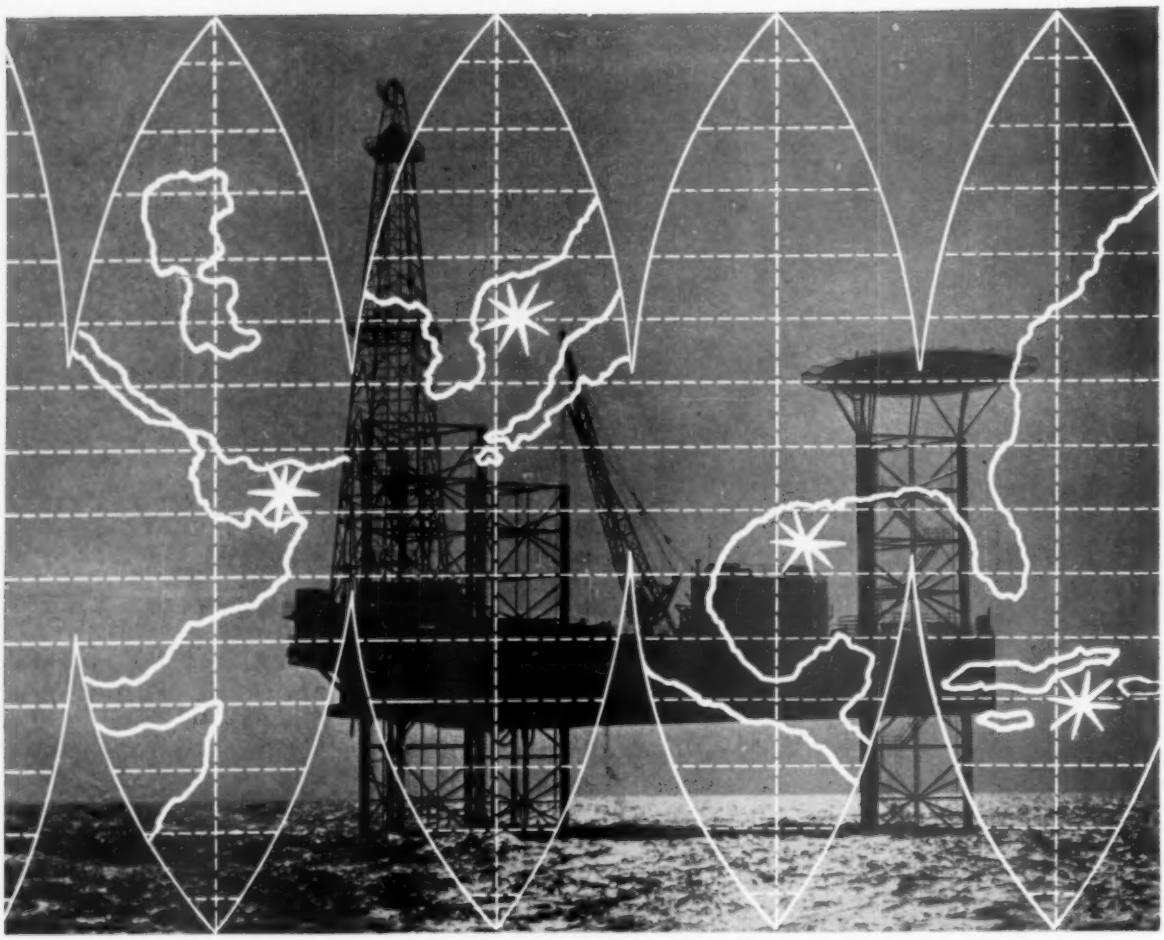


gasoline progress

How the story has been told

- 500,000 reprints of an *Ethyl News* article, entitled "A New Concept of Gasoline Progress," have been supplied to oil companies for distribution.
- Stories have appeared in more than 60 oil company publications with a combined circulation of over 1,000,000.
- Advertising, editorials, and articles have been used in oil trade publications with a combined circulation of 350,000.
- News releases explaining the story from the motorist's point of view were distributed to editors, and have appeared in hundreds of newspapers.
- More than 1,000 sets of slides and film strips are now being used by the Oil Industry in presenting the story.
- Over 2,500,000 copies of the picture booklet, "It's The Work That Counts," have been distributed.

ETHYL
CORPORATION
New York 17, N. Y.



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now operating in waters all over the world!

As the search for offshore oil spreads to remote corners of the world, LeTourneau mobile drilling platforms are operating under varied and challenging conditions. LeTourneau platforms are now drilling in the Gulf of Mexico . . . the Caribbean Sea . . . the Persian Gulf and soon the Sea of Japan.

While each platform utilizes the same basic design components, each is custom-engineered to meet the specific requirements of the operating company. LeTourneau engineers thus offer you a rich background of knowledge and experience in the construction of mobile offshore platforms . . . both self-contained and tender-assisted.

In addition to the many inherent advantages of the basic platforms, LeTourneau offers technical assistance from initial planning to moving on to location.

If your company is thinking in terms of a mobile offshore platform . . . we, at LeTourneau, would enjoy the opportunity of discussing the matter with you. No obligation, of course. *Write for our new brochure "Oceans of Experience."*

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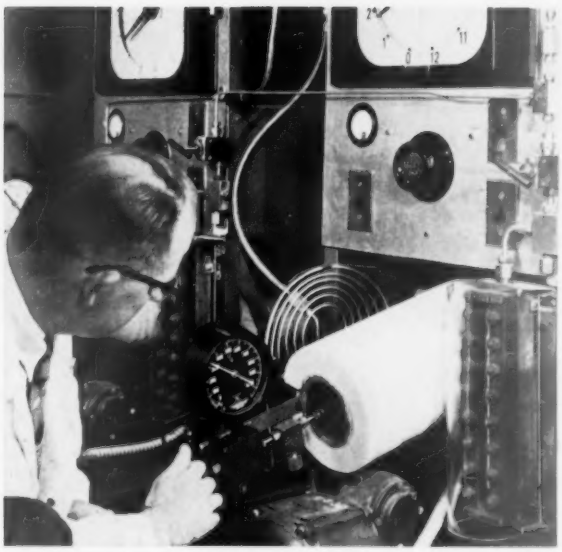
M-114

ELECTRON MICROSCOPE of Sun Oil Co. magnifies petrochemical and oil samples 60,000 times on fluorescent screen.



EXPERIMENTAL REACTOR is used by Indiana Standard for preparation of new types of polyethylene and polypropylene.

—with radiation of the crude before and after distillation. Also planned for radiation studies are Grahamite, Gilsonite, asphaltite, various lignites, and tar sands. A third important part of the study will concern radiation possibilities in alkylation, polymerization, and dehydrogenation.

Preliminary results indicate that gamma radiation may be used to bring about reductions in viscosity of crude oils and asphaltic cuts from the crudes.

Petrochemicals Move Up

Research into processes for making petrochemicals is steadily rising on the industry's priority lists—although the petroleum field still has a four- or five-to-one lead over petrochemicals research.

Continental Oil Co., for example, is giving more attention to petrochemicals than to any other single research field (production is second). Esso Research says its planning calls for "increasing emphasis on petrochemicals research." (The outlook for petrochemicals growth was reviewed in PW—Sept.19'58,p42.)

One source estimates that "as many as 80 oil companies are doing some research on polymers at the present time."

Says a top man with an oil research lab in Texas, "One of the largest impacts on the oil industry will be that of plastics. This will be particularly true of polyethylene and polypropylene. The latter could easily become the most important chemical development we have seen for a long time."

The researcher adds, "The polymers will get the oil industry into an entirely new economic and marketing field, as research unfolds new advances. This is because of the outstanding properties of the polymer, because of the low cost of the raw material—propylene, which is thrown away in propane—and because of the relatively low cost of the finished product.

"For the immediate future, polyethylene and polypropylene will be in the limelight. But other, small-volume, specialized polymers will be coming along. All of the gas unsaturates may be polymerized by catalysis. The polymers you can make become virtually unlimited. This is a tremendous field for the oil industry. It puts oil men directly into the chemical business."

Process Control Coming

Many companies are moving toward refinery process control, with the greatest activity in the simulation of plans on electronic computers. The experience gained here is aimed at eventual computer control of whole refineries.

Observes W. E. Slaughter, Jr., president of Aurora Gasoline Co., "There will be a minor revolution in the next ten years which will produce many instruments to measure properties during refining processes—as distinguished from simple measurement of temperatures and pressures.

"I mean such things as vapor pressure, viscosity, sulfur concentration, chemical composition, and boiling range. This may cost $10-million in a single small refinery, but it will be used to control and adjust processing as well as just measuring."

One company predicts that by the end of 1959, more than 300 small analog computers will be in use by oil companies to control, or partly control, refinery processing.

Atomic Energy Commissioner Libby predicts that "automatic control of petroleum refining will become practical within a very few years." He mentions as a key factor the introduction of a small amount of radiocarbon or radioactive hydrogen compounds at various processing stages.

Among the oil companies working with computer man-

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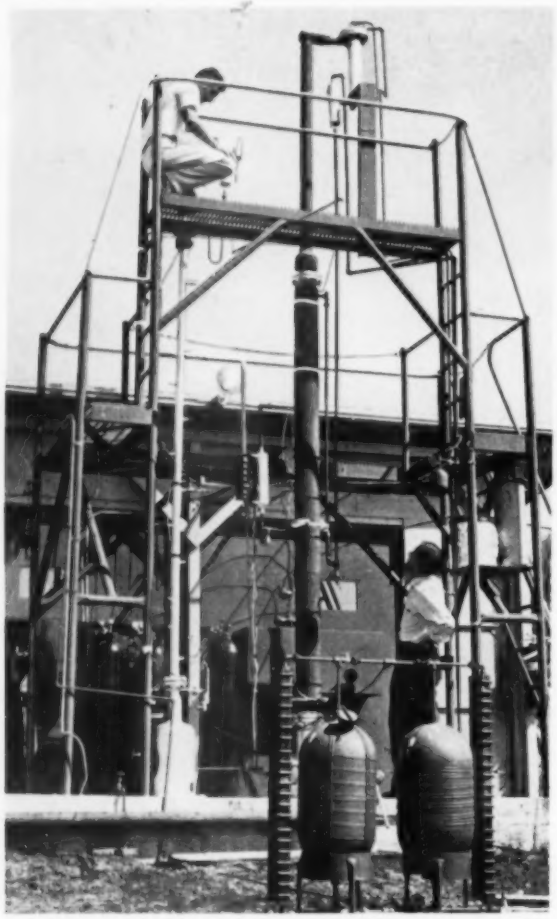
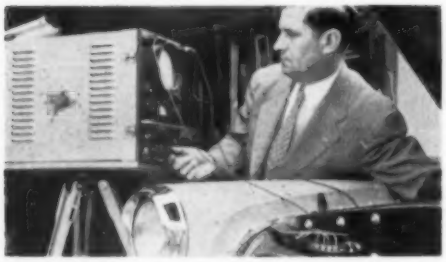
SPECIAL REPORT
RESEARCH



EXOTIC FUEL pilot plant is used by Southwest Research Institute to develop refining process.



At Service Stations, Too

Research reaches the market place with electronic engine analyzer developed by Socony Mobil laboratories. TV-like tube and screen help spot misfiring spark plugs and other engine troubles.

ufacturers in advanced research into process control are Continental, Esso, Phillips, Socony Mobil, and Texaco.

One of the main points of attack for research is the lack of enough knowledge of exactly what takes place in a refinery process. The current drawbacks to process control are outlined by a major company research manager:

"We do not know enough about reaction mechanisms in processes to be able to program all possibilities into a computer. The accuracy and reliability of our primary sensing elements (which sense temperature, pressure, flow rate, etc.) are inadequate for unattended, automatic controls. And there is need for better and faster methods of stream analysis." (However, despite the newness of process stream analyzers and the fact that all the kinks in them haven't been ironed out, one oil company is going ahead with 1959 plans to add 100 of the analyzers to the 200 it already has in use.)

Product Development Stressed

One of the largest items on the research budget is the industry's appropriation for evaluation of fuels and lubes. And gains in this research are getting harder to achieve. Says a research vice-president for a big major, "The over-all character of product development work has changed drastically in the past three or four years. Today, most oil products are pretty good. While there is still plenty of room for improvements, we no longer find ourselves just 'falling into' better products because of a great need for improvement. Now, much more basic knowledge is needed to replace the former 'cut and try' methods."

Gasoline engine deposits (the cause of octane loss, knock, rumble, etc.) are widely considered to be one of the biggest unsolved problems in the industry. Says a research manager, "A lot of fundamental research into combustion will be necessary to provide the answers. The basic causes and combustion mechanisms are not fully known."

The oil companies are active in research to improve lubricants—for both commercial and military use. Evidence of this work was the Air Force citation this summer of Shell Development and Monsanto Chemical for developing lubricants that retain their characteristics over a range from 20F to 800F. The polyphenyl ethers (composed of benzene and oxygen) are two to five times more stable under nuclear radiation than existing organic lubes. The fluids could be used as reactor coolants or hydraulic fluids, as well as lubricants.

There is still much research work to be done in solving corrosion and pollution problems. Observes a research chief, "Sulfur is a pollution headache, especially where you have catalytic desulfurization and get hydrogen sulfide gas as a byproduct. Pollution problems are getting worse because more sour crude is being used, and because state and local laws on air or stream pollution are getting tougher."

He adds, "Inspection for corrosion is one of the biggest reasons for a unit shutdown or turnaround. Besides the direct cost of corrosion removal and prevention, you have downtime, product losses, off-spec product in startup and shutdown, increased tankage to serve customers during offstream time, and time of maintenance crews. The corrosion bill in the oil industry is still tremendous."

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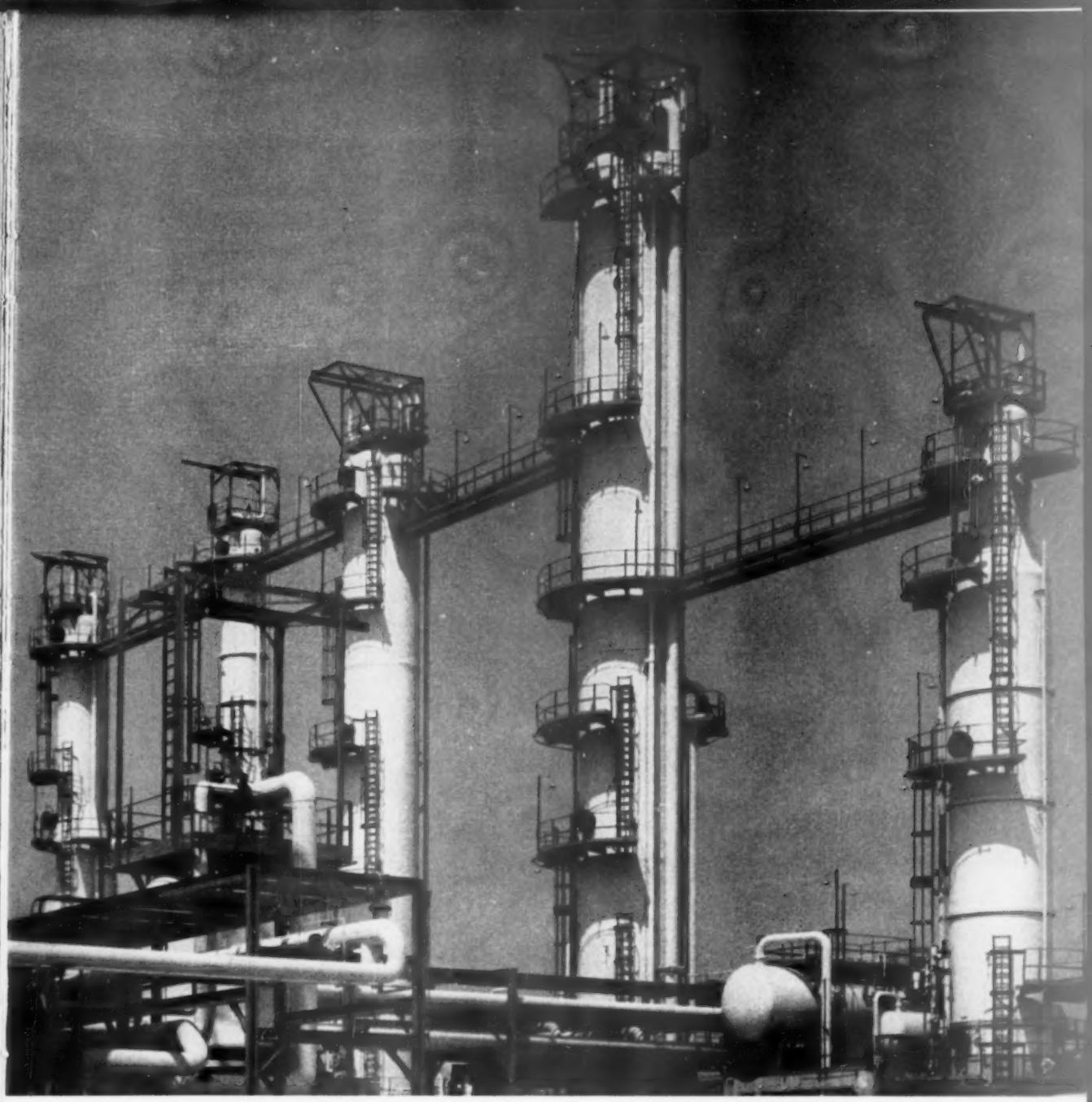

Third New Platformer for Gulf...

COLUMNS BY

GRAVER®

The third of three new 26,000 b/d Platforming® units to be installed by the Gulf Oil Corporation is now on stream at Gulf's Port Arthur refinery. Built under license from the Universal Oil Products Company, this latest installation will substantially increase the high octane potential at the refinery.

The five large columns above and two separator units were shop-fabricated at Graver's East Chicago plant and erected by Procon Incorporated, the general contractor. Eighteen columns for the other two Platforming unit installations at Gulf's Philadelphia refinery were also shop-fabricated at Graver's East Chicago plant.

Large or small processing equipment for petroleum, petrochemical, chemical and nuclear energy installations are produced with dispatch and skill by Graver artisans. Graver's century of experience means quality construction.

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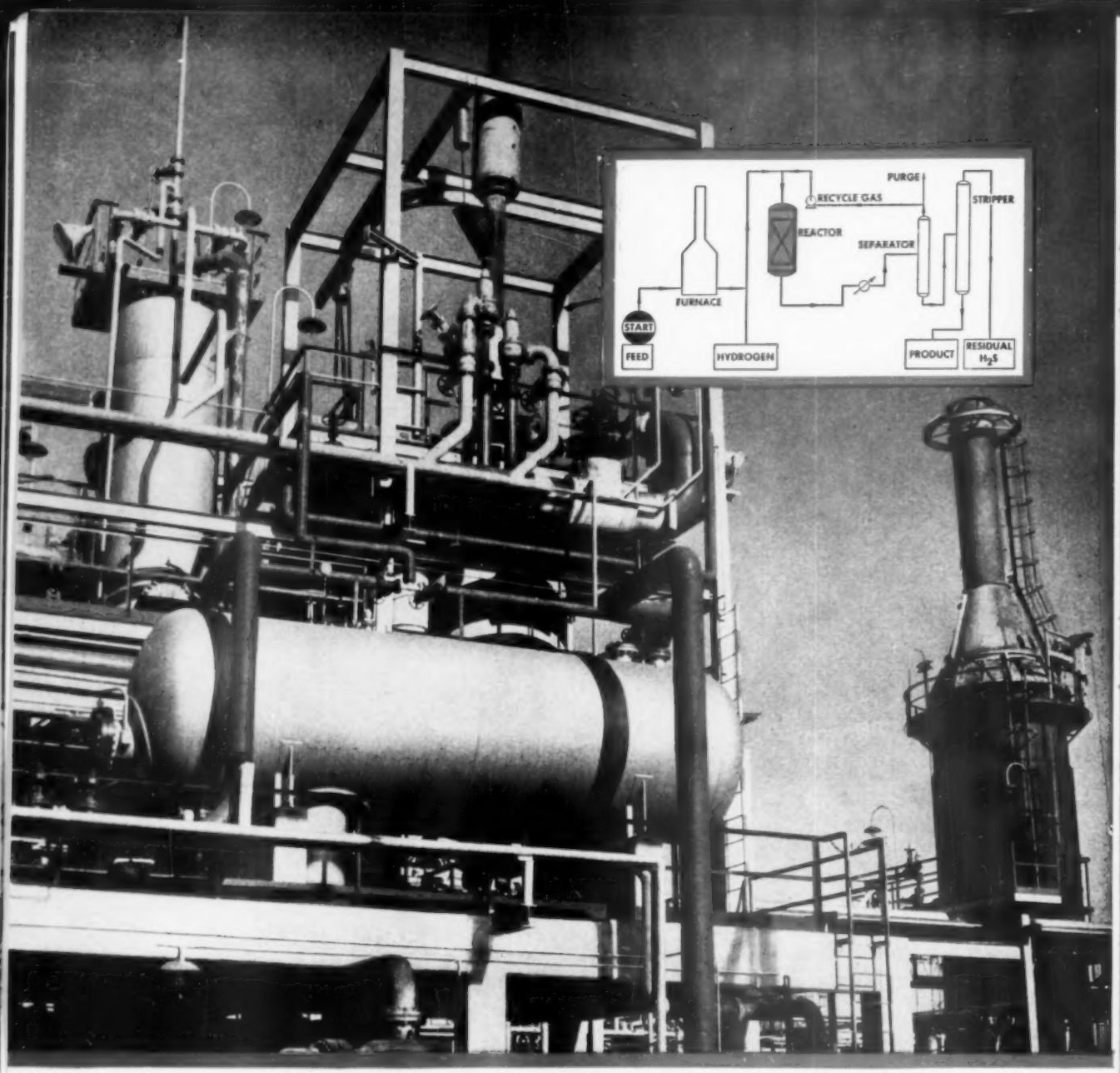

19,500 B/D CRACKED HEATING OIL HYDROFINER, ESSO STANDARD'S BAYWAY REFINERY, LINDEN, N. J.

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Esso Research and Engineering offers you *Hydrofining*, a process now being applied to a greater variety of feed than any other hydrogen-treating process. *Hydrofining* uses by-product hydrogen to remove sulfur and other impurities *without yield loss*.

The process improves product stability, odor, color and other quality characteristics without the disadvantages of chemical or clay treating methods. *Hydrofining* is another achievement of the Esso Research program — 39 years of new process developments made available to refiners around the world.

Hydrofining experience has been gained from commercial units processing a wide variety of feed stocks such as naphthas, distillate fuels, lubes and waxes. This experience plus years of hydrogenation research gives us a unique opportunity to recommend the best design for your plant.

Twenty-three *Hydrofining* installations are on stream; nineteen more are in the construction or planning stage. Licensees enjoy benefits of continuing *Hydrofining* research. *Hydrofining* can play an important part in helping you process previously unattractive stocks into higher quality products. We would welcome your inquiry.

ESSO RESEARCH AND ENGINEERING COMPANY

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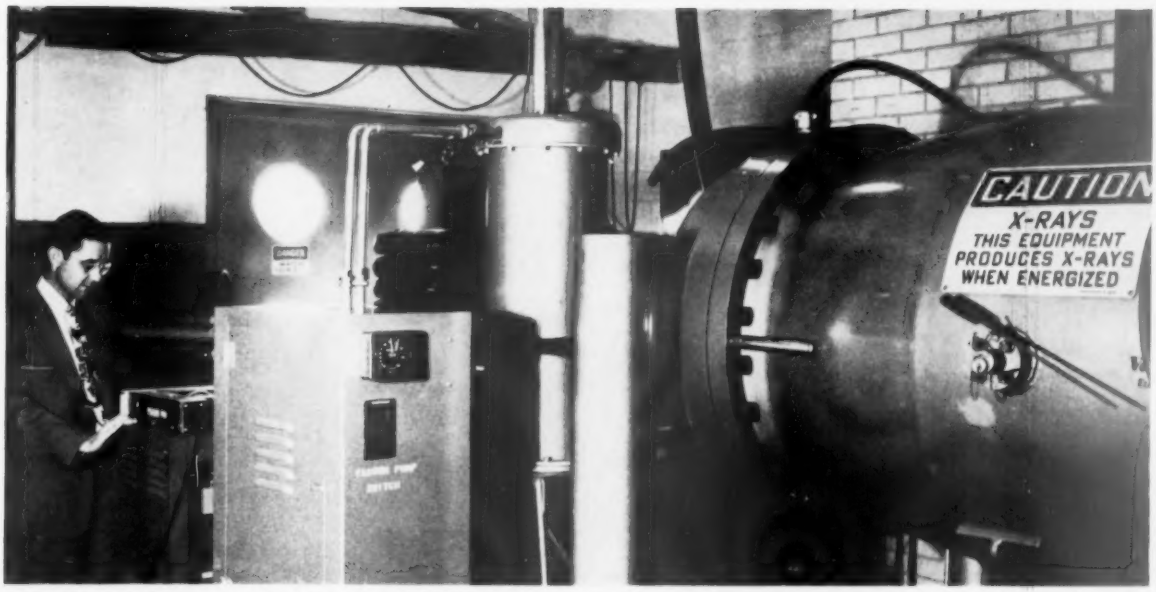
Your key to progress... an Esso Research process

SPECIAL REPORT
RESEARCH



2-MILLION VOLTS are output of Van de Graaff accelerator, used for exploration and production research by Magnolia Petroleum Co.

Wanted: A Direct Oil-Finding Tool

That's the big research target in exploration. In drilling, it's making hole faster. In production, it's recovering more oil.

The greatest research need in the oil fields? The answer, given by a top research executive in Tulsa, is good for the whole petroleum industry, not only for the production segment: "There is a compelling need," he says, "for a really new method of finding oil in the ground."

He adds, "The industry urgently needs to reduce the cost of finding oil. Better methods must be developed to handle the masses of geological and geophysical data that we now collect."

Almost every oil man surveyed by PETROLEUM WEEK mentioned as a prime research target the need for a better way to discover crude oil, ideally with a direct oil-finding tool.

"Maybe," says L. W. Erath, vice-president in charge of research for Southwestern Industrial Electronics Co., one of the Dresser Industries, "it will be some new concept of how to derive our information. This could be either a radical improvement in our present methods, such as the seismic, or some new approach entirely."

Improved drilling methods are also being considered a vital research need by oil companies. Typical view, from a Southwest research executive: "We need a better basic understanding of penetration by rotary drilling. To exploit air drilling properly, we need to learn how to keep water from entering the well bore. Despite considerable effort, the industry has failed to develop a radically new drilling method. Here is an opportunity for a major contribution from research."

Even more important in the eyes of many industry men is what one Texan calls the need for "finding ways to coax more known oil out of existing reservoirs, through primary and secondary recovery means."

One of the largest well-service firms states its view of the industry's greatest research requirements this way: "We need (1) to determine the causes for decreased oil production; (2) to find out exactly how surface-acting agents perform in a reservoir; and (3) to find out why *something* is necessary. By *something* we mean anything that requires a remedy—anything that prevents more oil from coming out."

Dr. N. D. Smith, Jr., director of Shell Development Co.'s Exploration & Production Division, in Houston, sums up the research outlook this way: "Most of the oil companies are agreed on the general areas that are important. Depending on the needs of individual companies, however, the emphasis will vary considerably." Smith sees the following as "some of the major problems":

- Understanding the origin of oil.
- Making broad geological studies to permit better interpretations.
- Finding new ways of using the reflection seismograph.
- Getting still more information from well-logging methods, and developing other techniques.
- Improving understanding of the physics of drilling.

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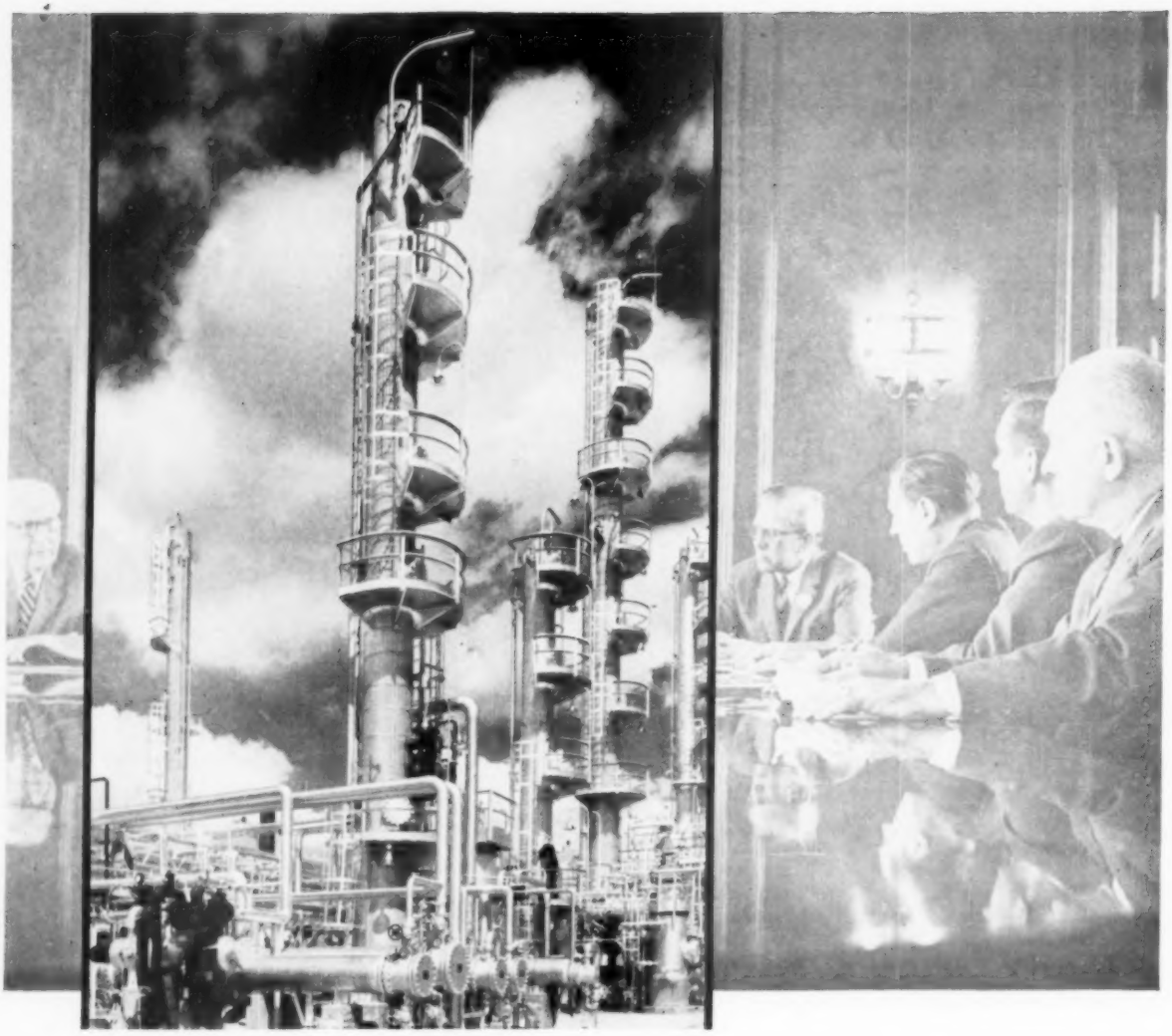

Pritchard applies automatic data logging with, above all, GOOD FINANCIAL DESIGN

Socony's new 6000 bbl/day catalytic reforming unit at Casper, Wyoming might have been just another refinery addition–except for one vital difference. Along with the usual vessels and piping, J. F. Pritchard & Co., engineers and builders of the unit, provided a complete data logging and scanning system to monitor processes. This centralized automatic system supplements manual supervision and contributes to more efficient operation. The end result is lower operating costs and more profitable refinery operation.

The construction of this ultra-modern refining unit is an example of how Pritchard looks beyond the obvious to engineer and build plants with good financial design – the "extra" that gives Pritchard clients maximum return on capital.

Pritchard's experience in petroleum ranges from the design, engineering and construction of individual processing units to complete refineries. Pritchard also serves the oil field processing industry with facilities for operations such as sulphur removal and recovery, natural gas dehydration and pressure maintenance. If you are considering new construction in these fields, ask Pritchard to show you how good financial design can work for you.

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SPECIAL REPORT

RESEARCH

RIGMOVER is now in experimental use by Creole Petroleum Corp. to move drilling rigs in Lake Maracaibo, Venezuela.

• Understanding better the mechanics of reservoir behavior, and developing better recovery techniques.

With such goals to shoot for, here is what oil researchers say they are working on:

Oil's Origin Is Hunted

In exploration research, there is considerable emphasis on studies of how oil was formed. "One of our main activities is geology," says a big-company research official. "We're doing a lot of work in sedimentology, and have spent a lot of money in the Gulf of Mexico to study recent sedimentation. We want to learn what environmental factors are conducive to the formation of oil and its migration into traps, as well as how these traps form. We also have a strong project going on to improve seismic methods of prospecting."

An oil company lab in the Southwest is concentrating on seismic instruments, log interpretation, and logging methods. In seismic instruments the company is "trying to improve signal-to-noise ratio, to get away from problems of scattering." The research men's over-all search is for methods "that will enable crews to work areas that are now unworkable—about 55% of the possible reflection areas of the U.S."

Several other exploration and production labs report emphasis on means of locating stratigraphic traps. An official with one of the labs observes, "We are looking for correlation in sediments that would indicate approaching pinchouts. We are primarily studying correlation methods through breakdown of materials."

One of the largest majors is stressing applied research into seismic recordings using photographic film (instead of line tracers), radioactive well-logging, and seismic velocity recordings. The company is also doing some research on

continued ▸

what does

$$\triangle F/A = \triangle p$$

mean to you?

(Continued on next page)

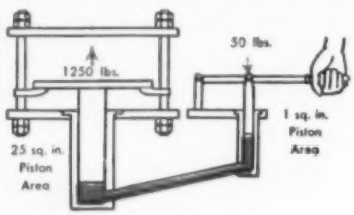
(Continued from preceding page)

$$\triangle F/A = \triangle p$$

. . . is the mathematical expression for Pascal's Principle which states that: "pressure applied to a confined fluid is transmitted uniformly to all areas of the confining fluid."

In the drawing below, notice how a relatively small pressure of 50 pounds applied to the 1 sq. in. piston raised 1,250 pounds on the 25 sq. in. cylinder. Pascal discovered how to multiply the muscles of man a thousand fold! Today, the light touch of a woman's toe against a foot pedal smoothly yet quickly slows and halts a two ton automobile.

Pascal's Principle had been known for hundreds of years when a man by the name of Sven Nordstrom successfully applied the principle to



Here is a demonstration of Pascal's Law. A given pressure of 50 lb lifts 1250 lb over an enlarged area of 50 to 1 ratio

create a most unusual innovation in valves—his invention, the lubricated plug valve. In the most elementary terms, this valve is simply an old fashioned plug cock (used since the days of Pompeii) to which Nordstrom ingeniously applied the Principles of Pascal.

SPECIAL REPORT
RESEARCH

WATERFLOODING is researched at Dallas lab of Atlantic Refining Co. with this long core flooding test equipment.

equipment, feeling that too much responsibility for research is left with equipment companies.

Southwest Research Institute, San Antonio, Tex., feels that a possible answer to exploration difficulties could be mysterious "traveling fluctuations in the gravitational field." Explains an institute officer, "This is a class of phenomena that is thought to exist—a class of waves that has never been discovered. They are not electromagnetic waves. The first problem is to show whether they exist. If they do, they might have enormous penetrating power. They could be useful for geological prospecting."

The institute also sees a possibility that a method could be developed to measure the density of shallower structures. The spokesman says, "Gravity meters now in use measure what has happened miles below the surface—indicating that there may have been upheavals that lifted the shallower structures. But the meters don't indicate the shallower structures positively.

"With new methods, it may be possible to achieve something of a stereoscopic effect to reflect more accurately the nearby, shallower conditions.

"Such new methods might measure accurately the density of the ocean floor, thus indicating its load-carrying capacity. Or in a desert, the methods might indicate whether rock is close beneath the sand. Or in an oil well, they might help determine whether formations are uniform."

In addition, Schlumberger Well Surveying Corp. hints that the particle accelerator work the company is using at its Ridgefield (Conn.) lab could conceivably lead to a direct oil-finding tool. Says President W. J. Gillingham, "There's no way of forecasting all the uses for the accelerator. We don't quite know what it might produce in the way of new commercial services. But we do feel that a tool that enables you to turn on and off your source of neutrons has a tremendous potential. It opens up an entirely new field, for example, in radioactive logging."

DRILLING MUDS and clay are studied by X-ray diffraction methods at Sun Oil Co. research laboratory.

Target: Faster Drilling

In drilling, several of the oil companies are helping to research the turbodrill, which as a result is getting a thorough test in all important U.S. oil areas, in Canada, and in all kinds of rock formations. A Southwest major that is studying the turbodrill and the sonic drill, in an effort to make hole faster, is now considering field tests on new, confidential type of drilling equipment.

A big company with headquarters in the East sees two research areas important in offshore oil. Says a top official, "First there are underwater completions in the Gulf of Mexico, where you have trouble with high pressures and the surface weather. The second area is drilling from ships. We consider both strictly experimental so far, even though some drilling from vessels has already been done."

Creole Petroleum Corp. still considers its water-borne Rigmover No. 1 as an experimental, research project, although tests so far give the company "high hopes" for success. The rigmover (picture, page 73) was designed for use in offshore drilling, and is being tested by Creole on Lake Maracaibo, Venezuela. It will pick up a rig substructure, derrick, drawworks, and drawworks engine as an integral unit and float the unit to a new drilling location.

Creole officials feel the Rigmover should mean considerable savings in money and time. It permits less costly drilling foundations. And it eliminates the need for permanent derricks.

In its research into cementing, Halliburton Oil Well Cementing Co. is looking for materials that will fit any problem—cements from 10 lb. per gal. in a slurry, up to 20 lb. per gal.—cements that will set up quickly, cements that will set up slowly.

A company spokesman says, "The research effort is pointed to cover any potentialities. We want to be able to

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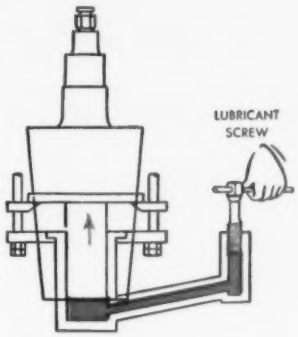
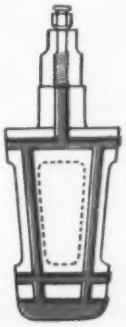
The perfect application of a principle



The lubricant system in the Rockwell-Nordstrom valve is a closed hydraulic system acting much like the two pistons shown on the facing page. Instead of having a separate piston to "charge" lubricant into the valve, the screwed lubricant fitting at the top of the plug acts as the first piston. When lubricant is forced through the fitting by a pressure gun or if the lubricant screw is manually turned down, hydraulic force is magnified and forces lubricant through the channels in the plug.

The plug then acts in much the same fashion as the second piston. A shot of lubricant from a pressure gun or a few turns of the lubricant fitting minutely unseats the plug upwards against the resilient shoulder seal, freeing the plug for smooth, easy turning.



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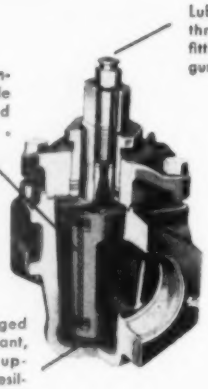
Here's why Rockwell-Nordstrom valves work better, easier and cost less to use, thanks to

$$\triangle F/A = \triangle p$$


Lubricant injected through Rockwell fitting by pressure gun.
Lubricant through channels in plug forms double pressure seal around each valve port . . . leakage eliminated.
Lubricant chamber, charged with pressurized lubricant, counterbalances plug upwards against slightly resilient shoulder seal. Plug can't be stuck in seat . . . instant, dependable operation.

The drawing above shows how lubricant in Rockwell-Nordstrom valves assures the bottle tight shut-off, smooth, easy operation and unmatched dependability that users have learned to expect over the past forty years. Rockwell-Nordstrom, the *original* lubricated plug valve, is also the world's most complete line. They cost no more to buy, often less, than ordinary valves. Whatever your valve needs, there is a Rockwell-Nordstrom valve that will do the job better, longer and at lower cost. If you'd like to know more about these valves or if you'd like to talk with a Rockwell field sales engineer, write Rockwell Manufacturing Company, Pittsburgh 8, Pa. Canadian Valve Licensee: Peacock Brothers Limited.

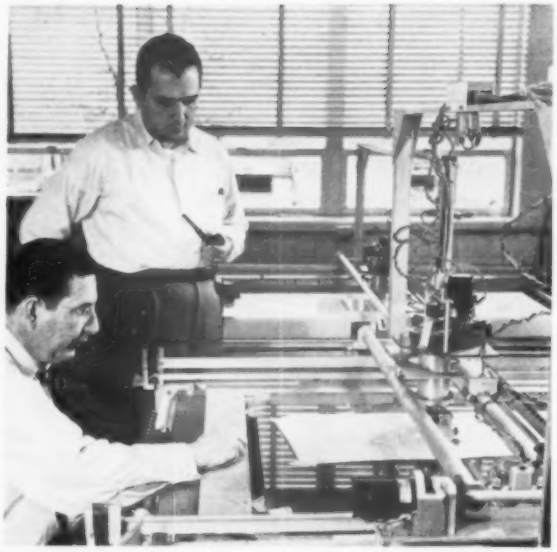
ROCKWELL-Nordstrom VALVES

it's ROCKWELL

MANUFACTURING COMPANY

SPECIAL REPORT

RESEARCH



RESERVOIR study is carried out by Sun Oil Co. researchers with potentiometric analyzer developed by the company.

have products and techniques that can be used when wells go as deep as 50,000 ft."

Secondary Recovery Booms

"In production," says a major's general manager of research, in summing up for the industry," probably the biggest single research item concerns reservoir behavior, including new secondary recovery techniques. One of the most important things we are trying to do is improve our prediction of how a reservoir will behave under various schedules and methods of production. To do this, we're using all types of electronic computers."

Quite a few companies are paying close attention to experiments with in situ combustion as a means of recovering more oil.

"In situ combustion," says one production researcher, "looks good on paper and in the lab. But the trend is toward combining this with field tests."

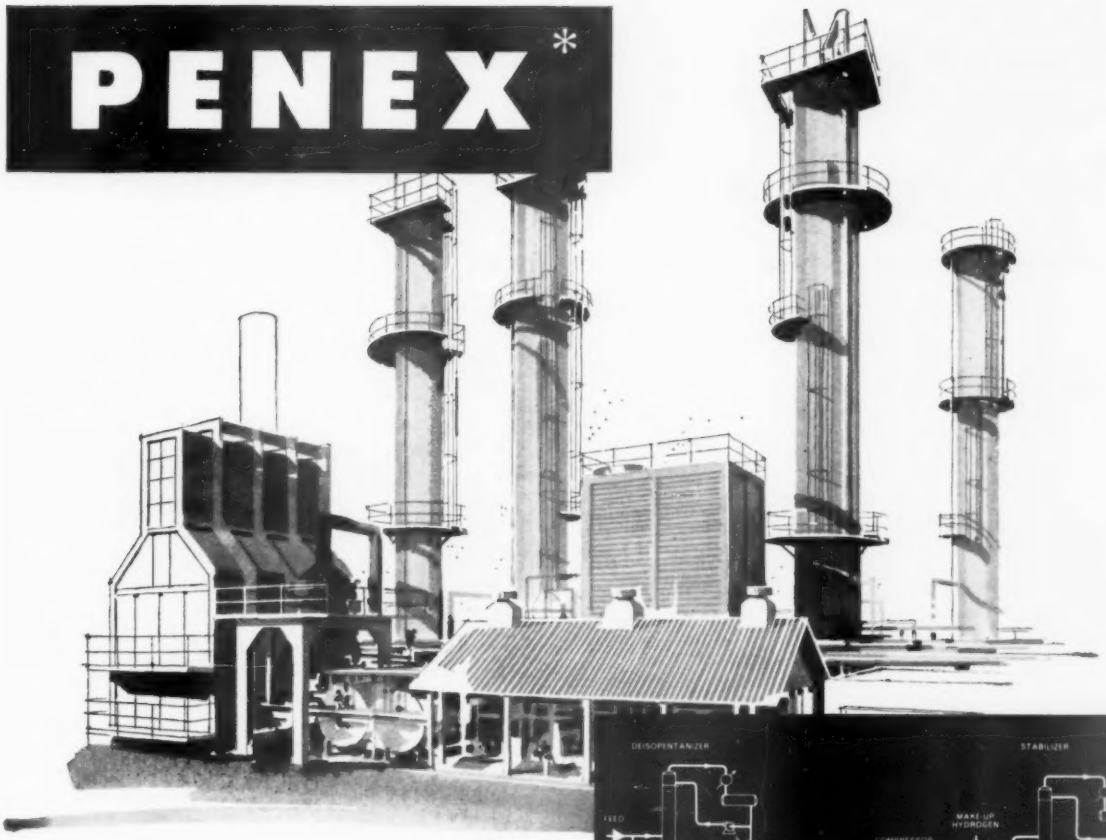
Also favored are studies of miscible-gas drive. A spokesman for one production lab says his people are "concentrating" on various miscible drives—including "propane slug, high-pressure gas, with variations, such as gas and water following the propane slug."

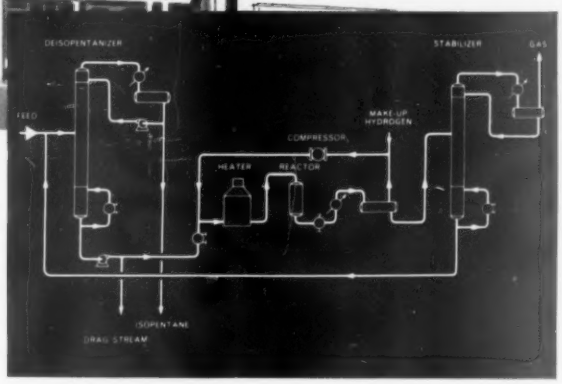
The subject of considerable blue-sky thinking is the use of radiation to produce oil. Says a representative of Southwest Research Institute, "It has been suggested that the ultimate you are looking for is to turn the oil field into a refinery. This might involve taking a high-viscosity field, pumping radiation wastes into the field, letting it heat up, then producing it 25 years later.

Nuclear explosions underground? For now, an oil company research head says, "They don't look economic, and they contain serious risks."

continued ▸

PENEX*





New process converts light, normal paraffins to isoparaffins

Here is a process which for the first time enables the refiner to economically upgrade pentane and hexane fractions, thus producing a high octane product with improved burning qualities, without plug-fouling and pre-ignition, with better sensitivity and better lead susceptibility.

The Penex process is economical in installation, operation and maintenance. Regeneration is not required, thus reducing capital investment, simplifying operation and reducing maintenance. Catalyst and reaction products are non-corrosive so lower cost carbon steel construction can be used.

Penex has an additional advantage when used with a reforming process such as Platforming®.

Make-up hydrogen used in Penex processing is derived from the Platforming net high pressure separator gas. Hydrogen is consumed in insignificant quantities. This combination of processes also gives a considerable yield advantage at the same octane number.

Many other UOP processes are available to the refiner who is seeking ways to improve his operating efficiency and manufacture the kind of products that will bring him maximum market and economic benefits. These processes are available to all refiners. They are described in an informative fully illustrated booklet, "UOP Processes and Products," which will be furnished on request. Write for your copy today. Address:

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More Than Forty Years Of Leadership In Petroleum Refining Technology

SPECIAL REPORT
RESEARCH

Pipeliners Watch Meters and Pumps

Accurate measurement of big volumes is a prime research target. Others: corrosion prevention and lighter pipe.

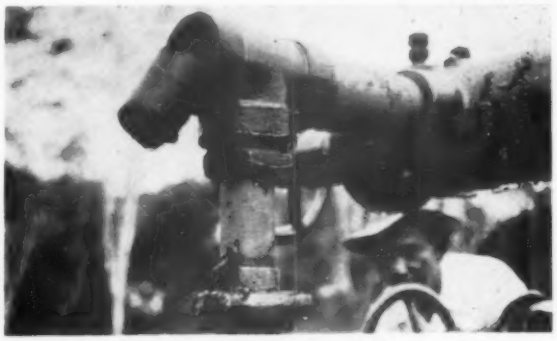
Emphasis in pipelining is being given to on-the-job research into metering—with improved positive-displacement and electronic meters getting special attention. Several majors are looking into the Pottermeter, which uses an electronic flow-sensing element to measure oil flow up to 20,000 bph. Developed by Pottermeter Co., of Union, N.J., the meter is about to be field-tested by at least two pipeline affiliates of big oil companies. Says an executive with one, "We look to the Pottermeter for use on product lines in the future. But we are reserving any opinions on use with crude lines until we determine the effect on the meter of any real change in oil viscosity."

Adds an official with another company, "With positive-displacement meters working out so well in ACT, we are now getting to the point where we want to evaluate the Pottermeter for similar use. But even if it should prove satisfactory, we expect it would take us some time to convince other companies, to which we transfer crude and products, of the meter's worth."

Oil-company research into pipeline pumping is fairly limited, but there is some blue-sky thinking about prime movers. Sample comment by oil men:

- "Questions have been raised as to whether nuclear-powered pump stations might be feasible in 15 years or so. It's an interesting possibility. Don't discount it."
- "The free-piston engine might some day become a prime mover for pipelines. But maintenance costs would have to be trimmed."
- "If you could justify the cost of compressing equipment, you might find yourself some day pumping natural gas through pipelines as a liquid."

Internal corrosion in pipelines is a continuing research target. "We feel that many of the external corrosion problems are just about solved," says a pipeline official. "These new plastic tapes, when used with cathodic protection, do a mighty good job. But we're still looking for the answers to internal corrosion."



SOLID CRUDE plug produced by Standard-Vacuum Oil Co. in Sumatra shows problem researchers face in finding ways to pipe heavier oils. (Standard-Vacuum heats its Sumatra line.)

One of the oil majors is about ready to announce a new thin-film pipe-coating, a petrochemical, which the company feels will give the best available external protection.

Oil men are watching closely the research being done by pipe-makers in improving aluminum and nonmetallic pipe. "It would be a mistake to write off steel pipe, which is going to be carrying the load for a long time," says a major company official, "especially with progress being made on thinner-wall, high-strength steel pipe. But the way we see it, there would be important reasons for using a nonmetallic pipe. With plastic pipe, you can say goodbye to the corrosion problem. But joining the pipe remains a big problem—that, and the fear of change.

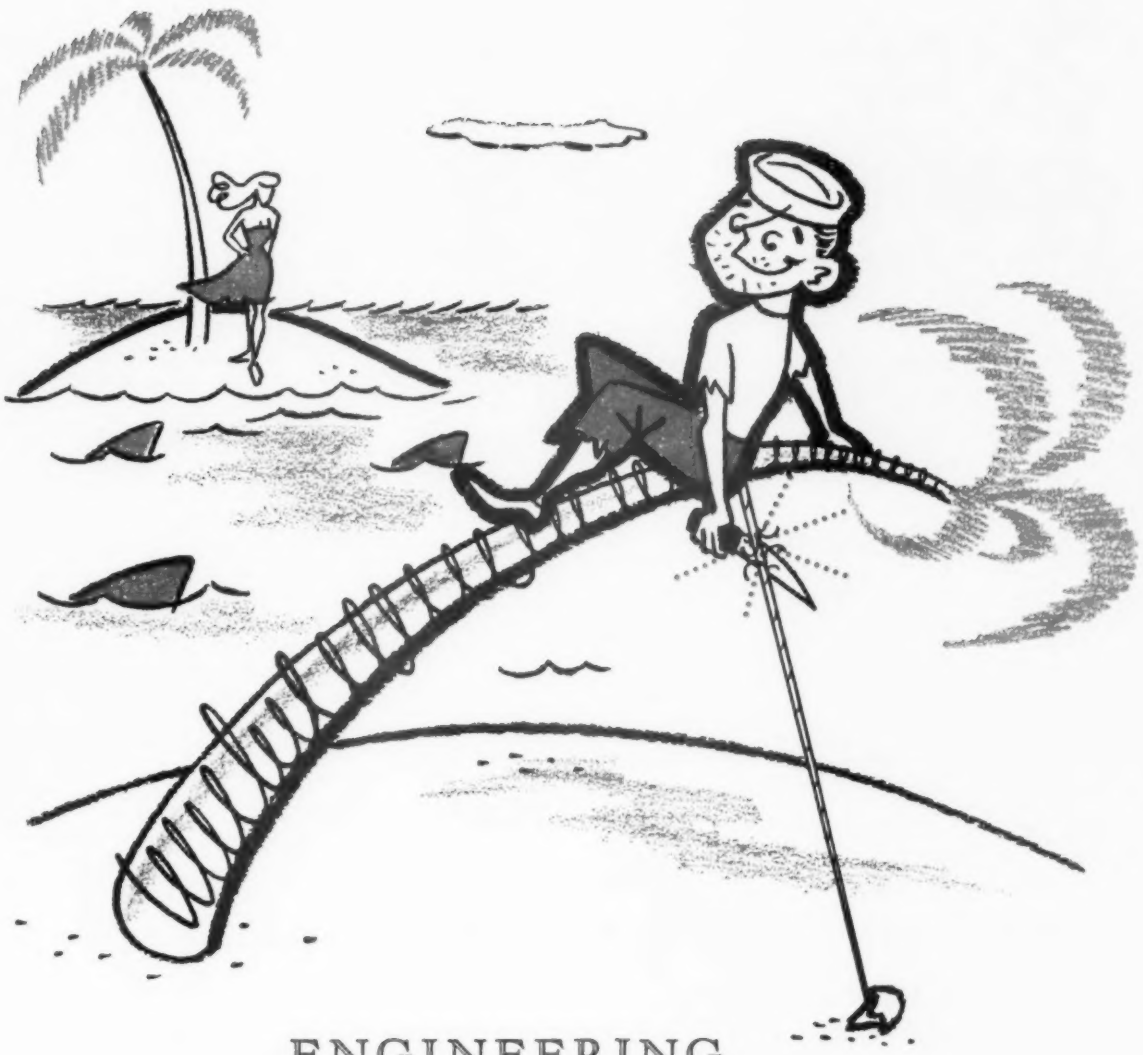
Aluminum pipe is in growing use, but still in the experimental stage with some oil companies. Also, results from automatic welding research by one of the majors are being "awaited anxiously" by operations men.

continued ▸

Submarine Tankers Coming

Oil tankers of tomorrow may look something like this model, designed for the U.S. Maritime Administration. But regardless of appearance, the submarine tanker using atomic power is a fairly sure bet for the future. Government-paid researchers are most active in studying such designs. They feel the best size for an atom sub tanker would be a 40,000-ton vessel capable of doing 40-knots. But smaller, slower sub tankers are also being studied.

Design studies on atomic tankers are also being carried out in England and Sweden.



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SPECIAL REPORT

RESEARCH

Oil Research Is Paying Its Way

Dollar return is hard to measure, but successes outweigh the 'failures.' And 90% of the effort is on operations problems.

"We expect research to contribute more than it costs over a reasonable period of time." This view, expressed by an executive of a West Coast major, is typical of that held by most big oil companies.

"No rigid rule applies," observes a Tidewater Oil Co. official, "but projects are expected to have a reasonable chance of success, and also to have a profit potential."

Says Dr. Philip C. White, general manager of Indiana Standard's research and development department, "The company has no formal, fixed dollar-payout program on research. But when we go into a new project, we try to figure out a return."

California Research Corp. doesn't think in terms of a direct payout. However, since 1944 (when the company was established as a separate corporation), consolidated sales of the parent California Standard have climbed from $329-million to $1.7-billion (in 1957).

Company men say it's difficult to tell how much credit Cal Research should get for the increase, but that it should be liberal.

The evaluation is easier in the case of another California Standard affiliate, Oronite Chemical Co. Cal Research developed every one of Oronite's products, and Oronite has grossed almost $700-million on these products in the past 14 years.

Companies like Leonard Refineries, of Alma, Mich., get a quick measurement of results because, as an official explains, "Our type of research work relates either to the salability of products, or to the manufacture of new products, for an already established market."

"If we were to have any objective," says one top research man, "I'd say it ought to be at least a 20% return on our basic investment. If you had that as an objective, you might be able to get something like 10%. At least you'd probably get something more than zero."

Some of the oil companies make little attempt to arrive at an economic justification for research. Says one flatly, "There is no way of computing a dollar return on research. The problem is that too many unknown factors come along. There's so much erosion with time. And economic factors that don't hold up tend to cut down your return."

A Mid-Continent major's view: "Much of the research payout is intangible. The dollar payouts that are tangible

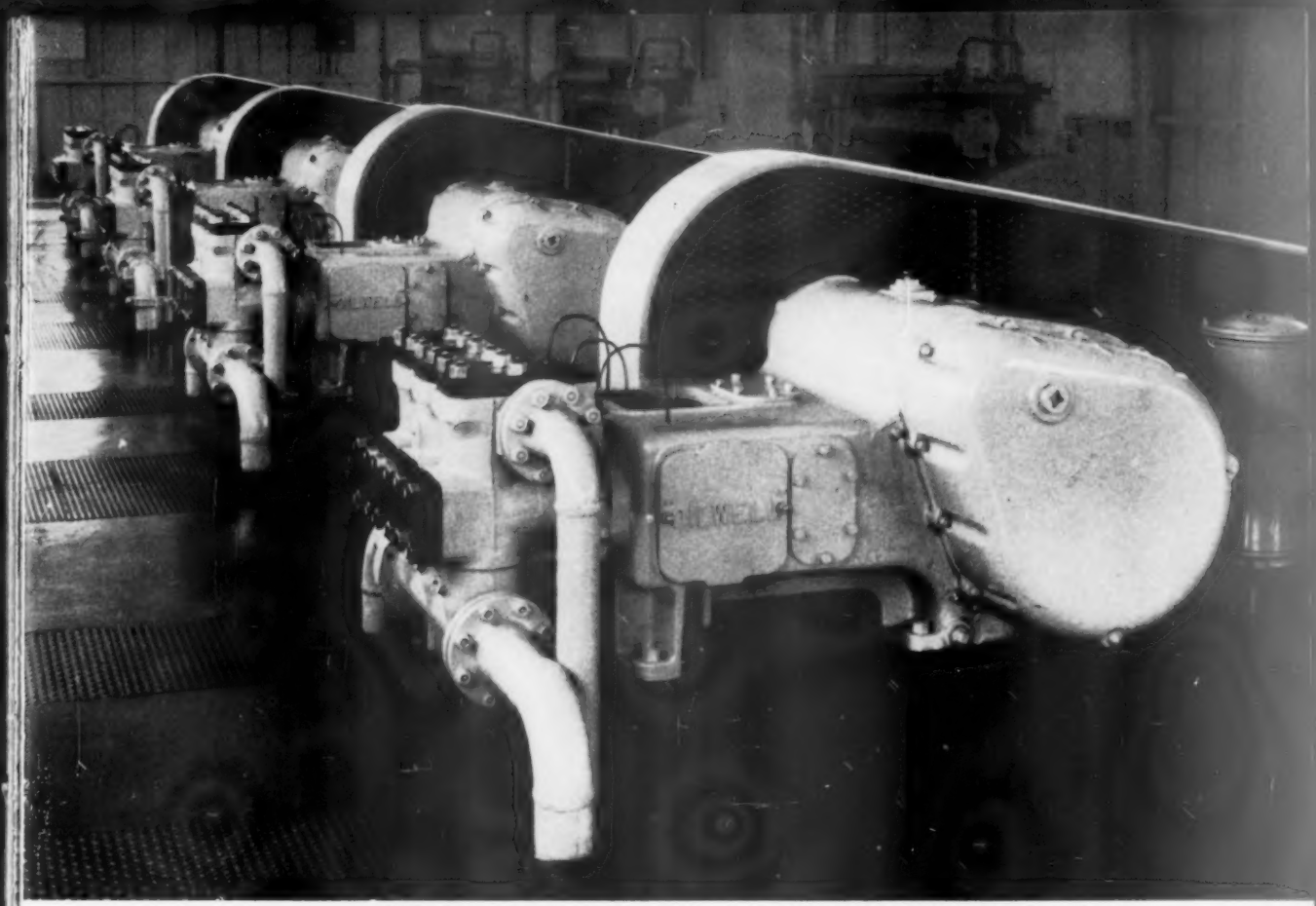
continued on p. 90 ▸

Research Centers owned by U.S. oil companies are among the finest in the world. Yet the petroleum industry is continuing to spend millions each year for new or expanded facilities. A sampling across the country . . .

OHIO OIL CO.
Denver.

STANDARD OF OHIO
Cleveland.

SHELL OIL CO.
Houston.



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Let us help you plan for WATERFLOODING!

THERE'S nothing particularly new about waterflooding. "Oilwell," for example, has been building pumps for the purpose since 1927. Nevertheless, more and more new waterflooding practices are being uncovered every day, and it's good business to keep informed on the situation.

You'll find a real storehouse of practical experience tucked under the hat of your "Oilwell" representative. He gets around and understands the basic problems encountered in current waterflooding practices. Needless to say, he's more than willing to discuss them with you.

And, naturally, he's in the very best position to talk about the outstanding line of "Oilwell" Plunger Pumps—available in a great range of displacements, working pressures, gear ratios, and fluid-end materials. He can also help you select automatic controls, metering equipment, prime movers and manifolding materials.

Of course, you'll want specialized engineering assistance in installing any waterflood project. But during the planning stages it's good common sense for you to capitalize on our wide experience and take advantage of our time-proven services.

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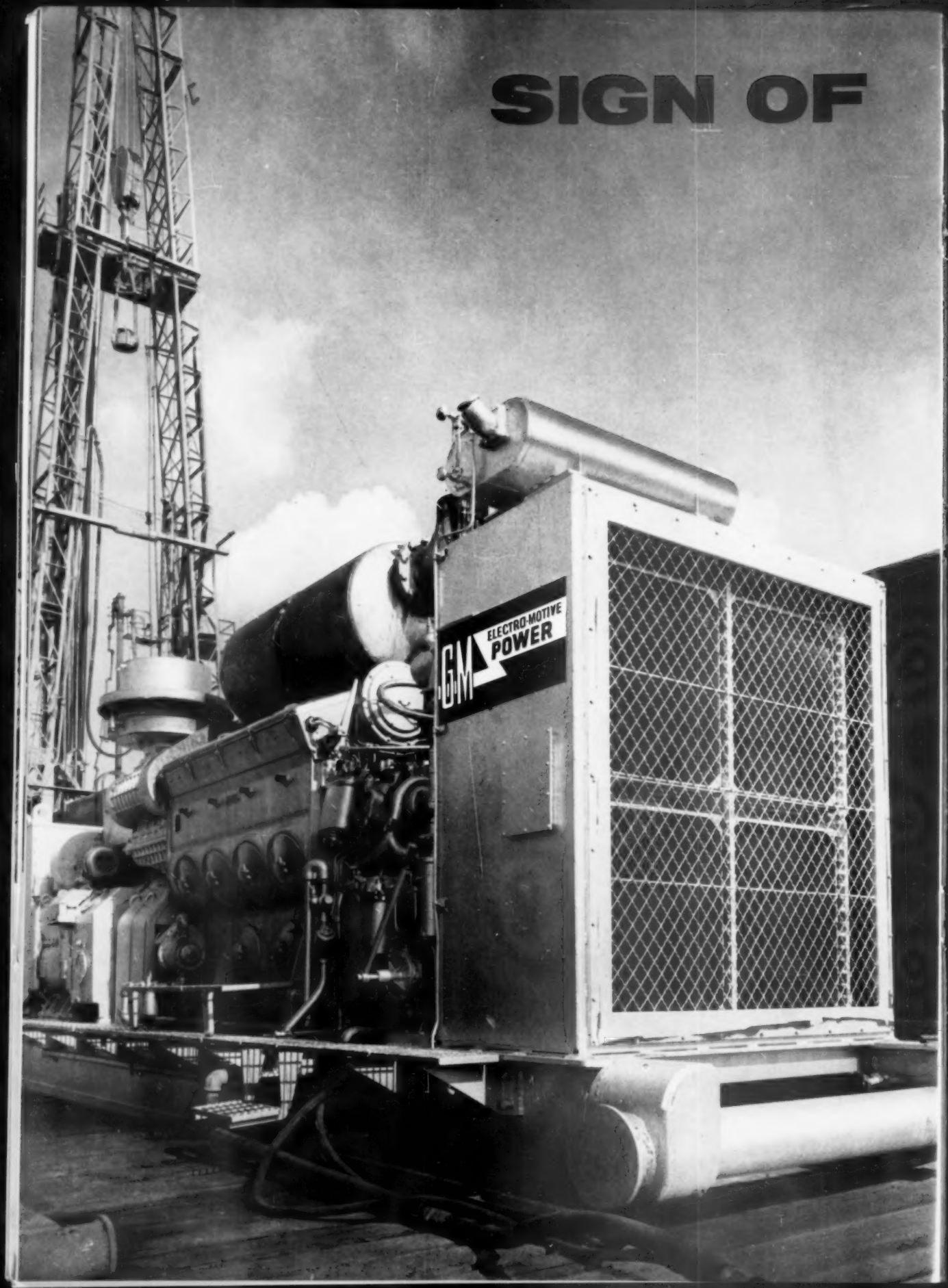
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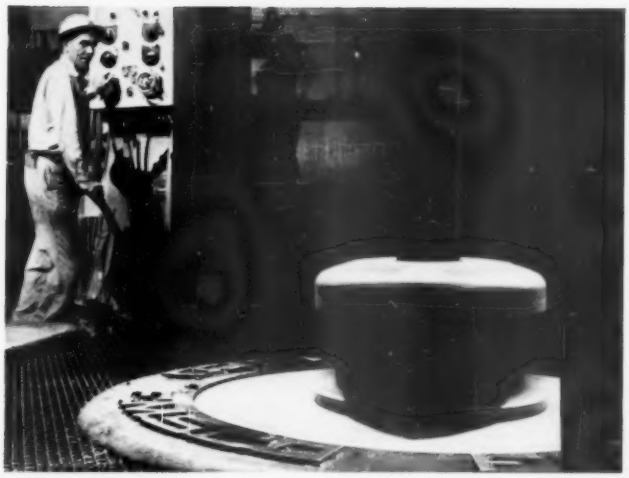
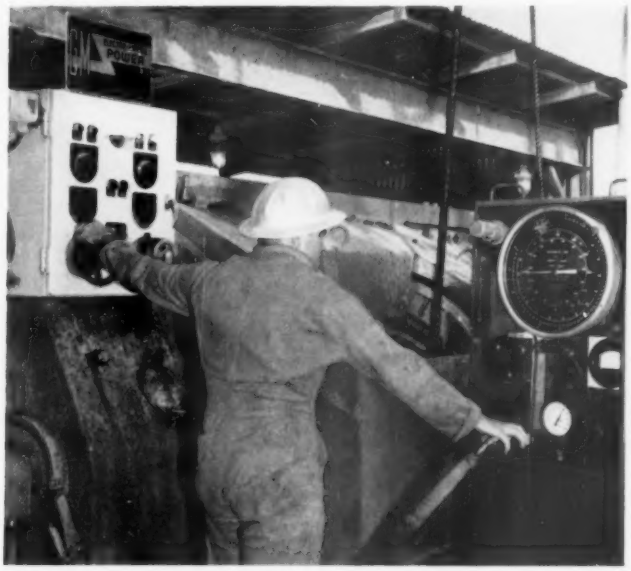
POWER

DEEP DRILLING . . .

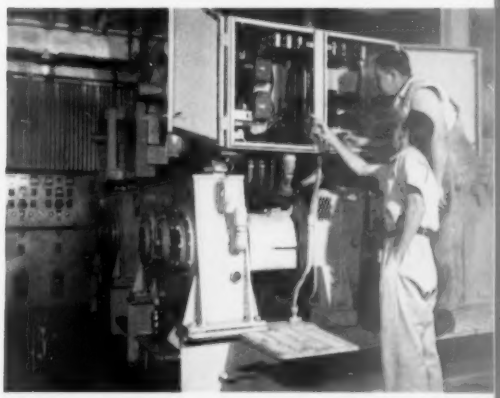


Sign of fast, economical drilling. Each generating unit has a 1000 hp Diesel driving two 640-kw generators. Drive motors deliver up to 800 hp each. These motors are working now on the largest draw works, mud pumps, rotary tables. This is the power that goes deep. This is the power that drills fast at low cost.

Sign of tested, dependable power. Electro-Motive Power is used on more Diesel-electric rigs than any other make. Good reason, too. Electro-Motive builds the *complete* system. Components are designed as an integral unit—matched to work better, last longer.



Sign of sensitive, accurate control. Electro-Motive controls combine the "feel of steam" with the instantaneous response and accuracy of electric drive. Centralized panel gives driller supervision of all Diesel-electric equipment including safety shutdown.



Sign of one manufacturing responsibility. From rig planning through operation. One responsibility simplifies engineering, installation. It means one source for service, parts. It's yours with Electro-Motive Power.

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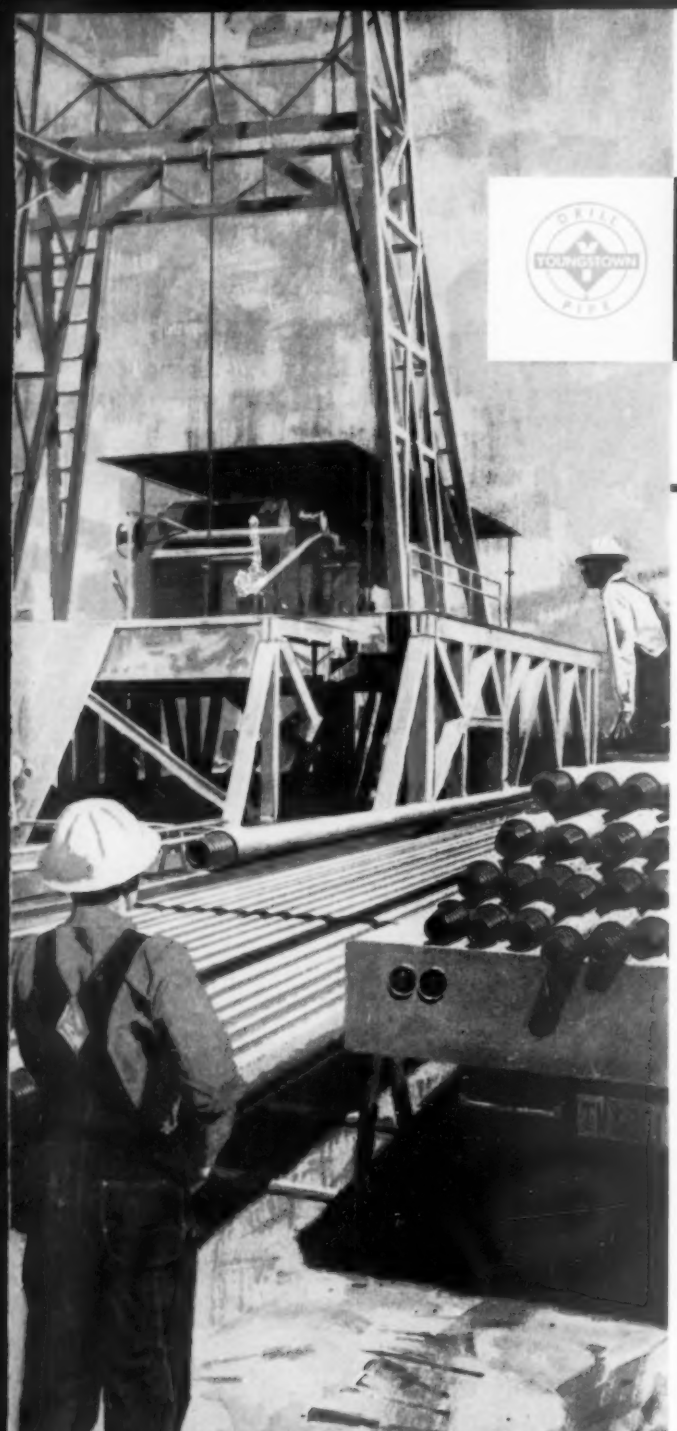

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LET'S TALK DRILL PIPE

. . 2⅜″ through 5½″ API sizes . . u
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GRADE D	YIELD STRENGTH 55,000 psi
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X-95	YIELD STRENGTH 95,000 psi
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Developed by Youngstown and included five API grades are lightweight drill pi crease rig depth range and special fatig and torque resisting pipe for deep holes designed for more rotating hours under drilling conditions. This wide selection drill with Youngstown drill pipe to all de in all formations with maximum effi maximum economy.

This drill pipe is made for all types of to so specify the one you want . . and k Youngstown quality too.

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Youngstown tubing is available in all A and grades for every well condition. quality-control assures fast make-up, h strength and smooth, free-flowing interi

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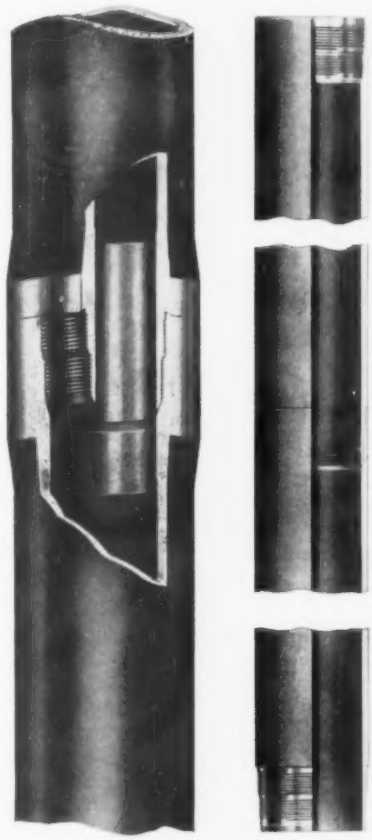
FLUSH JOINT is an extremely strong casing joint. Because of its positive shoulder action, these casing joints transmit high torque loads without creeping and can be broken-out and made-up repeatedly without damage to the threads. Smaller OD allows use of one size larger FLUSH JOINT casing than with collared casing. In sloughing or caving formations, the running speed of FLUSH JOINT is of great importance. It can be run through packers at high speeds, under high or low pressures without damaging them.

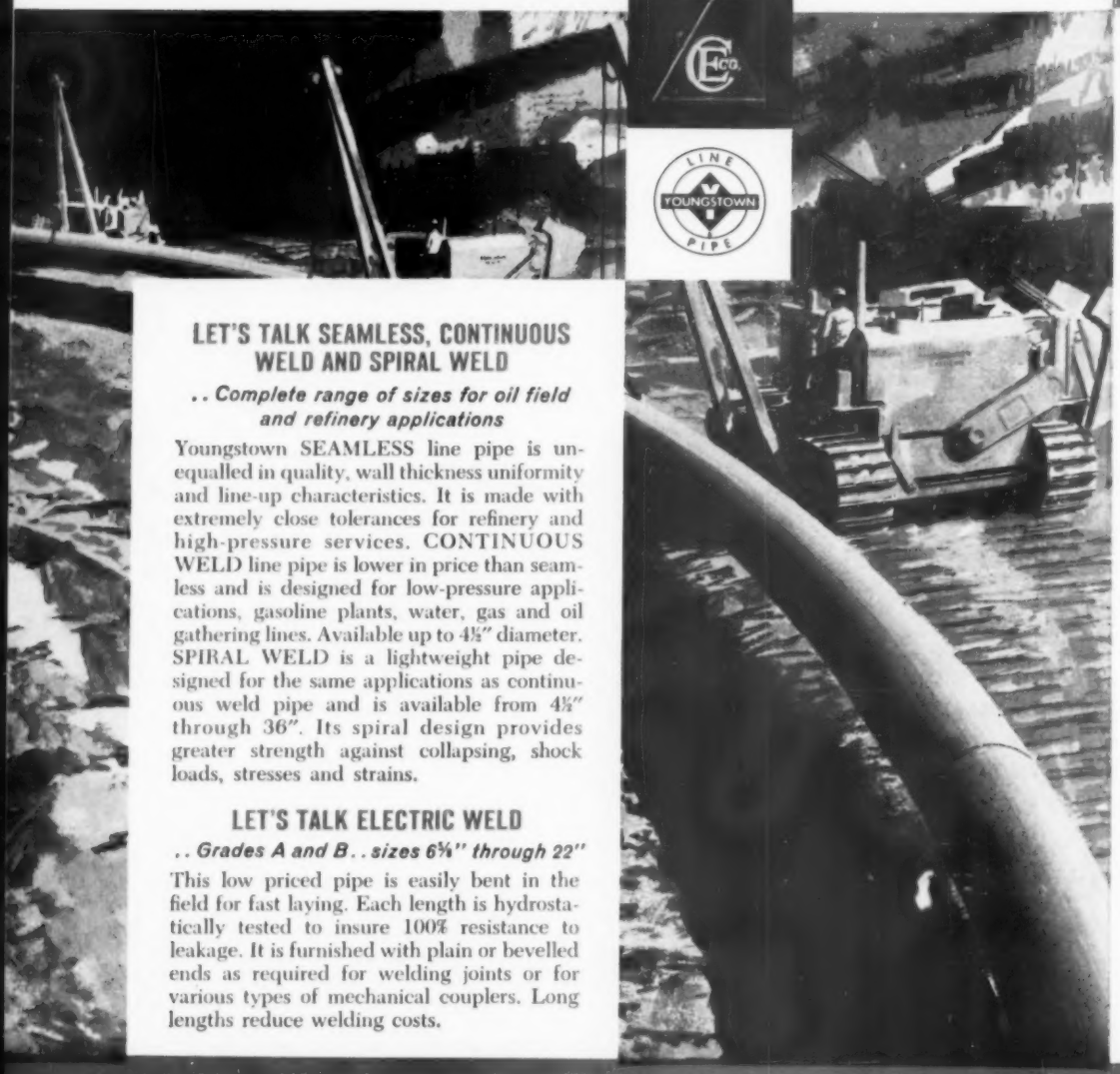


SPEEDTITE FLUSH JOINT

BANDS say TOP QUALITY

KEEPING OIL AND GAS ON THE MOVE

Your Continental-Emsco and Youngstown *pipe team* stands ready to recommend the right pipe for your pipe line installation, whether for transmission lines, gathering lines or water-flood piping systems. This team is backed by a complete range of grades and sizes in all wall thicknesses and in single or double random lengths.



LET'S TALK SEAMLESS, CONTINUOUS WELD AND SPIRAL WELD

.. Complete range of sizes for oil field and refinery applications

Youngstown SEAMLESS line pipe is unequalled in quality, wall thickness uniformity and line-up characteristics. It is made with extremely close tolerances for refinery and high-pressure services. CONTINUOUS WELD line pipe is lower in price than seamless and is designed for low-pressure applications, gasoline plants, water, gas and oil gathering lines. Available up to 4½" diameter. SPIRAL WELD is a lightweight pipe designed for the same applications as continuous weld pipe and is available from 4½" through 36". Its spiral design provides greater strength against collapsing, shock loads, stresses and strains.

LET'S TALK ELECTRIC WELD

.. Grades A and B.. sizes 6¾" through 22"

This low priced pipe is easily bent in the field for fast laying. Each length is hydrostatically tested to insure 100% resistance to leakage. It is furnished with plain or bevelled ends as required for welding joints or for various types of mechanical couplers. Long lengths reduce welding costs.

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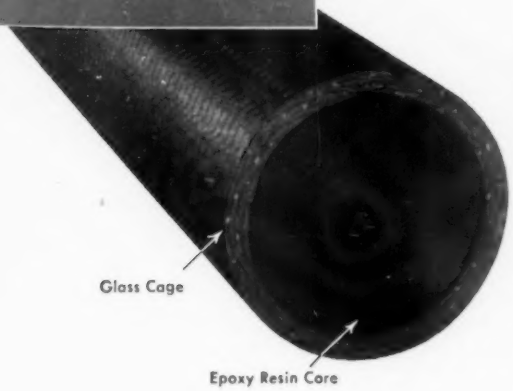
Talk "special piping applications" with your Continental-Emsco pipe men. Their recommendations of special pipe materials will solve sweet, sour, salt water corrosion and paraffin problems. Special pipe diameters and fittings are available for unusual gathering lines, dual-zone pumping, water flooding and other applications. Let C-E tackle your tubular problems with experience, quick delivery and warehouse facilities.



FIBERCAST .. *A high-pressure, high-temperature modern pipe for use in oil fields, chemical and petro-chemical plants*

FIBERCAST is made in API diameters and up to 21′ lengths. It is lightweight and furnished with the most complete line of fittings ever offered in a non-metallic pipe line for fast, leakproof hook-ups.

Drawing shows the glass cage made of continuous fibers braided into a glass sleeve of multiple seamless layers. This cage gives FIBERCAST its unusually great axial strength. Inner epoxy resin core is centrifugally cast to impregnate the cage as well as form a corrosion resistant, free-flow interior wall.

These plastic pipes are available in all standard iron pipe sizes .. up to 20′ in length. They have long lasting qualities in low-pressure, low-temperature, corrosive installations. GREEN TRIANGLE X-TRUDE, made of high-grade extruded thermoplastic, is lower in price and more flexible than PVC pipe. GREEN TRIANGLE PVC is a heavy-duty, polyvinyl chloride pipe .. unexcelled in resisting corrosion. It is one-half the weight of aluminum .. one-sixth the weight of steel.

GREEN TRIANGLE X-TRUDE AND PVC PIPE..

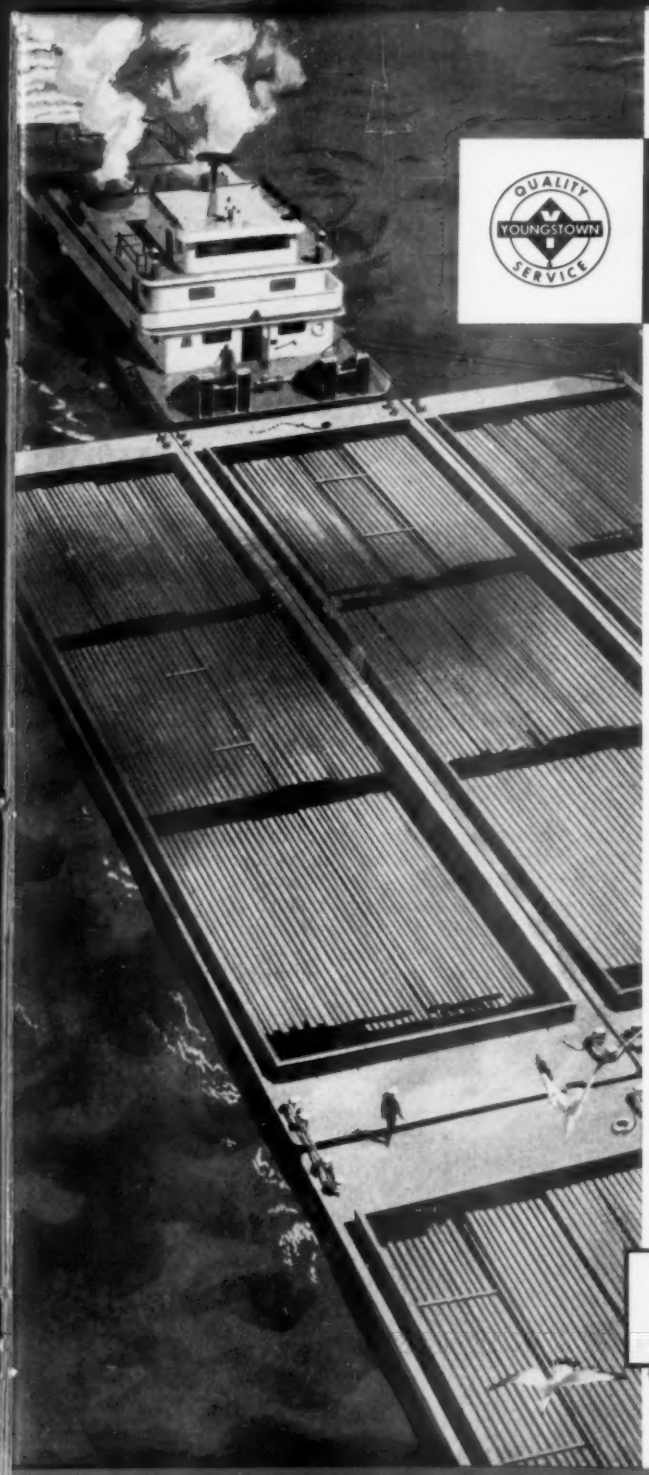
Designed for low-pressure, low-temperature flow lines, salt water disposal

Aluminum pipe is highly recommended for gathering lines where its resistance to corrosion gives it exceptionally long life. Its light weight and flexibility make it easy to lay. Tool pushers find that aluminum pipe, used for temporary fuel and water lines, is fast laying and economical because of its light weight.

ALUMINUM PIPE..

Light weight.. corrosion resistant

TUBULAR NEEDS..



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We know pipe. We have the pipe grade and size to meet every oil field piping need efficiently .. economically. For *pipe engineering* Youngstown field engineers working in conjunction with C-E men are available to make pipe recommendations for those special, ticklish jobs. Continental-Emsco stores are handy, convenient supply points for valves, fittings, gauges, pumps, compressors and the thousand and one items needed for pipe installations and servicing.

CONTINENTAL-EMSCO ..

Supplies pipe to all branches of the petroleum industry .. **WORLDWIDE**

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Continental-Emsco is also a distributor for Mannesmann Tube Company Ltd. in Canada.

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At strategic locations, pipe shipments are trucked to your lease for fast delivery.

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lag several years behind the research effort and the expenditures. And they are usually the result of coordinated activities of research and operating-department personnel.

Says a vice-president with an Eastern major, "Who should get the credit? Research finds the process, but operations designs, builds, and operates it. And no one makes out if marketing doesn't push it.

"Many companies have tried to figure research payout over a period of years. About the only concrete statement is one a chemical company man made: 'If the company is doing well, research must be doing well. If the company is doing poorly, the research must be doing poorly.' "

There's a fair amount of research work being done by oil companies just to keep up with competition. "We work out a research budget," explains the head of a production research lab, "knowing that it takes so much money to do an ample job in specific areas in order to keep competitive."

"Sometimes," says a New York oil executive, "you have to undertake projects regardless of whether a payout can be expected or not. These projects are the type you just have to do. In other words, some projects are purely defensive."

No one has the secret of telling when to call off a research project that's headed for a blind alley. "Determining when to stop," says W. J. Gillingham, president of Schlumberger Oil Well Surveying Corp., "is one of management's most difficult problems. We frankly haven't found a solution."

He adds, "We've had some projects that cost a lot of money and didn't yield a thing of any real value. That looks like a lot of waste. On the other hand, we've had some projects that didn't look promising at all—yet turned out very well. We do know this—when one of our tools does turn out well, it carries a lot of the load imposed by the failures."

Applied Research Is Stressed

Roughly 85% of the research being done by oil companies is "applied" research, in the sense that it is aimed solely at actual operations problems. The remaining 15% is directed toward discovering new "basic" facts about science, with no oil industry applications considered in advance.

Of 21 companies giving a breakdown for PETROLEUM WEEK's survey, six say their research is divided 90%-10% in favor of applied research. Two say their research is split 85%-15%. Three list 80% for applied and 20% for basic research. Others indicate that their research work is mostly applied.

Generally, companies say they find it difficult to draw a really clear line of definition between the two kinds of research.

A common observation is made by the production laboratory official who says, "Our laboratories work only on projects that arise directly or indirectly out of some specific problem. The research is all motivated by some hoped-for benefit. However, some of the work is not directed toward any particular application.

"In oil reservoir work, for instance, much of the research is aimed at learning how reservoirs behave, how fluids move —not so much at developing a specific method of changing reservoir behavior and the movement of fluids. With this distinction, I'd say 10% to 15% of our work is basic,

RESEARCH CENTERS (continued)

CONTINENTAL OIL—Ponca City

RICHFIELD OIL—Anaheim, Calif.

GULF RESEARCH—Harmarville, Pa.

another 10% to 15% is in the twilight zone, and the remaining 70% to 80% is unquestionably applied."

Eger V. Murphree, president of Esso Research & Engineering Co., estimates that about 20% of his company's over-all research expenditure is for basic research—using the definition of basic research as the type of study that would be so classified if it were conducted in a university.

Several big companies are doing no basic research of their own. Ohio Oil is one of these. The company feels that the universities and foundations are better equipped for the basic research fields, and that the company's best approach is through participation in the basic research programs of these outside organizations.

However, Ohio Oil permits its professional men to spend 10% of their time on research of their own choosing. Basic research in this case is not discouraged.

Another major has what one executive calls "a strong petroleum slant" even on to the 8% to 10% of total research that might be defined as basic. "When considering new scientific developments or projects," he says, "we always try to determine how they can be applied to petroleum."

Adds a top official of a major company's pipeline affiliate, "Broadly speaking, the company doesn't go in for pure research in its pipeline research. We use a more practical approach. When something needs testing, it's brought out to the pipeline itself and put through its paces. This goes for equipment either for building or operating the line. "Of course," he adds, "we use the company labs to backstop such on-the-job experiments, but again only for specific problems. We try to steer clear of the vague projects that probably will never pay out anyway."

More Tools Coming

The next year will see a modest expansion of research facilities by oil companies. This will add to the fairly extensive building of recent years.

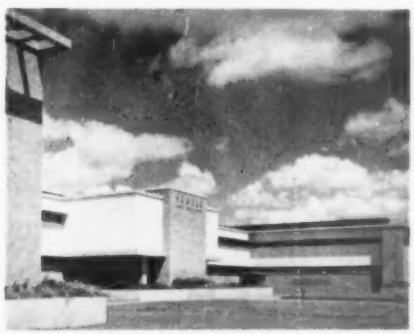
Indiana Standard, for example, is just completing a new lab for refinery technical services, plus a new pilot-plant building, at Whiting, Ind. The company's solid-propellant facility at Seymour, Ind., is also currently being enlarged. In the near future, there will be more automotive lab facilities at Whiting, and petrochemical research facilities will be enlarged.

Standard of Ohio isn't stopping with the completion this year of its new $2½-million research center in Cleveland (picture, page 80). Due for completion next year is a $1-million program to expand Sohio's process and product development and automotive engineering laboratories in Cleveland. New pilot-plant space will be provided—as well as laboratories, engine test cells, and an all-weather chassis dynamometer.

Sun Oil Co. is also building a dynamometer to create all-weather road conditions for use by the company's automotive laboratory at the Marcus Hook (Pa.) refinery. Sun recently completed a $2½-million, four-story building for research and development work at Marcus Hook.

By late 1959, Esso Research & Engineering Co. expects to have completed three research buildings on the 675-acre tract recently acquired by the company at Florham Park, N.J. The buildings will accommodate more than 1,000 scientists, engineers, and supporting personnel.

continued ▸



HUMBLE OIL—Houston.

CITIES SERVICE—Cranbury, N.J.

PURE OIL
Crystal Lake, Ill.

SPECIAL REPORT

RESEARCH

The Manpower Outlook Is Better

But good men are still tough to get. To make their work most productive, companies favor meetings with operations.

Many of the oil companies and research institutes surveyed say the market for engineers and scientists is better than it has been for some time. Sample comment, from different areas of the country:

- "We find there are enough scientists available for research. We believe the situation is helped by the present industrial retrenchment."
- "There is no shortage. In fact we have had to let some of the lesser personnel go, because of the recession."
- "The research manpower market has eased. While you always have some trouble finding a specific man to fill a specific need, it is much easier now."

However, the comment is widespread that it's hard to find enough high-caliber men. And some categories, such as physicists and electrical engineers, are in short supply. Here is what some companies say:

California Research Corp.—"There's a shortage of quality, not quantity. It's difficult to get top-flight physicists, mathematicians, geophysicists, and mechanical engineers on the PhD. level."

Tidewater Oil Co.—"Things are better than they were two years ago, but it's still hard to find good research men. We're leaving some vacancies until we find them."

A southwest production research lab—"All the chemical and petroleum engineers we need are available. There's a shortage of physicists, engineering physicists, and electrical engineers.

A major company office in Texas—"Manpower is very tight for top-notch physicists and mechanical engineers. We're competing with the missile and aircraft people. We're in better shape on chemists and geologists."

A West Coast major—"It's always a problem to get good engineers and scientists. The men who are usually available are the ones who drift around, looking for a Utopia they never seem to find."

Teamwork with Operations

What's being done about the potentially wide gap between men in the research labs and men in operations? Most of the larger companies seem satisfied with their research advisory committees, which provide over-all coordination. Continental Oil is one of many with a separate committee for each function, such as exploration, production, and petrochemicals.

California Standard gets management coordination through a research committee of executives (often vice-presidents) from California Research and the operating affiliates. There is a research committee in each of four fields: chemicals, petroleum products, petroleum processes, and oil field research.

At Richfield of Los Angeles, both refining operations and research report to the same vice-president, who gets information and recommendations from several coordinating committees.

An Eastern major has three research committees (product development, process development, and exploration and production), composed of managers in operating companies, parent-company headquarters, and the research company. The research men suggest the program for the coming year, and then go over it with the committees, item by item.

The research men have found the product development people most open to suggested improvements. "The process people," says a research executive, "are harder to sell, because they always suspect someone of trying to change their refinery."

Intracompany meetings are an increasingly popular way of coordinating. Examples: Men from Atlantic Refining's Southwest Division office and research laboratories at Dallas have frequent meetings at all organizational levels to discuss research progress and the application of results.

Sun Oil Co. has members of the manufacturing department's technical service group sit in on research and development meetings—so that each staff may have the benefit of the other's information.

Research lab supervisors of a major company operating in the Southwest meet with operations men every other month. They visit company regions to talk to field people about twice a year—and also meet with top management.

A Pacific Coast major company executive says, "The secret is conversation between men. You can say it in a lot of fancier ways, but that's what it boils down to."

Some oil companies have cemented coordination by assigning both research and operations men to the same project team. A variation of this is described by an official who says, "We have set up scientific objective groups, made up of operating and research personnel, whose responsibility it is to study and recommend areas of research."

Another major holds formal training courses at the laboratory for operating personnel. These last up to six weeks, with classwork and homework.

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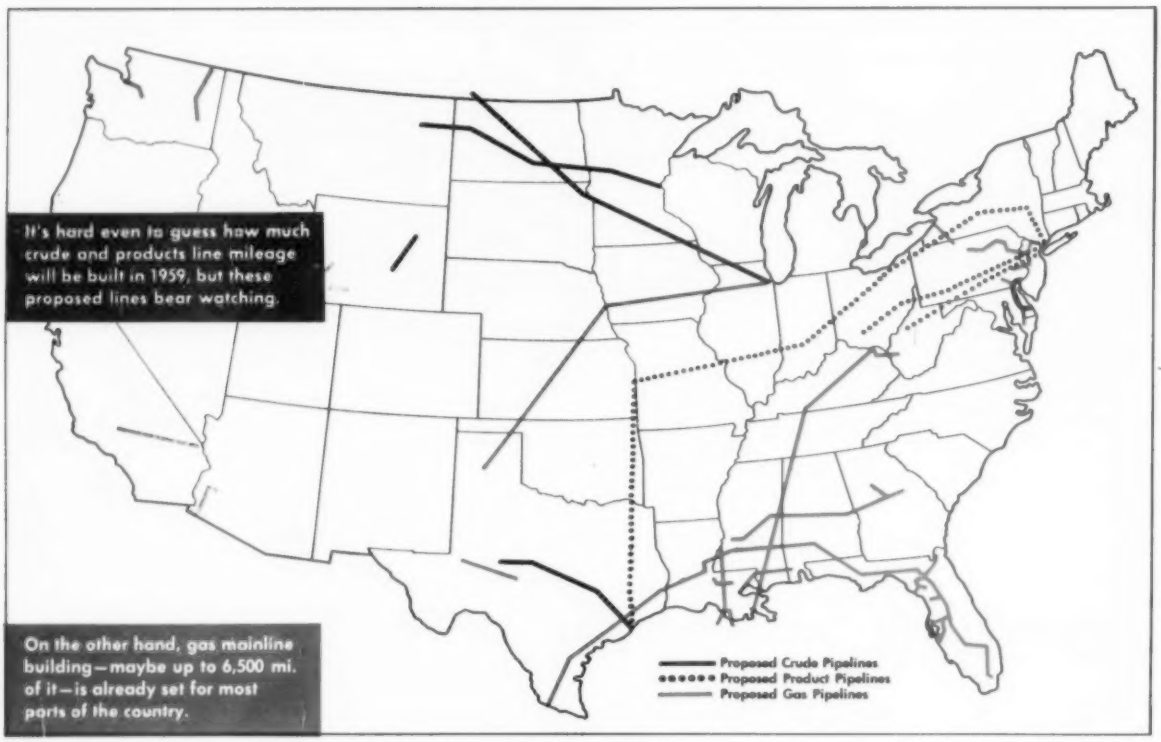
Oil and Gas Transportation in 1959:

Important strides will be made in each of the methods


It's hard even to guess how much crude and products line mileage will be built in 1959, but these proposed lines bear watching.
On the other hand, gas mainline building—maybe up to 6,500 mi. of it—is already set for most parts of the country.
Proposed Crude Pipelines
Proposed Product Pipelines
Proposed Gas Pipelines

Pipelines

Building Aplenty, But Few Records

Almost any way you look at it, 1959 shapes up as a mighty good year—although probably not a record-breaking one—for U.S. pipeline building.

It's too early for anything but estimates on the '59 pipeline-building picture, but a check of existing and upcoming pipeline plans makes for optimistic estimates.

It's hard to get even estimates of 1959 crude and products line building. But this much seems certain: It would take action on virtually all the proposed long-distance crude and products lines to put 1959 with the best post-war years in such building.

The experts' reluctance to pin down figures on probable construction of crude and products lines next year has its roots in the great variation such totals have shown during the past five years. Since 1953, the annual total of such construction has gyrated like this: 7,353 mi. in 1953, 5,340 mi. in 1954, 4,948 mi. in 1955, 2,750 mi. in 1956, 5,014 mi. in 1957, and an estimated 4,600 mi. in 1958.

And although many crude and products lines have been proposed for 1959, trying to guess how many will actually be built is a hazardous job at best.

Here are some of the more ambitious crude line proposals:

- Great Northern Ry.'s plan to build a 400-mi. to 600-mi. crude line along its right of way from the Williston Basin to the St. Paul area.
- International Oil Pipeline Corp.'s 30-in. line, which would start at Edmonton, cross into the U.S. in North Dakota, and reach refineries in the Chicago area.
- Cape Pipe Line Co.'s proposed 30-in. line to carry crude from Delaware Bay to the Philadelphia refining center.
- The plan of Gillete Pipeline, Inc., and A. W. Hartwig, Inc., to build a 100-mi. line from northeastern Wyoming to Casper.
- The proposal of a group of majors to build a new big-inch line from the Midland (Tex.) area to the Gulf Coast.

All major proposals for products lines center on increasing pipeline movement of LPG to northeastern markets. Texas Eastern Transmission Corp. would do this by extending its Little Big Inch products system from Ohio to New York; Underground Storage & Exploration, Inc., has plans for a line over the same general route; and the Katy and New York Central Railroads propose to take southwestern LPG to the Northeast by way of a 2,500-mi. line.

The railroads would use their own rights of way most of the way.

Here Are the Coming Highlights

of moving crude oil, products, and natural gas.

Nevertheless, even completion of all these lines—which is highly unlikely because the proposed major products lines tend to cancel each other out—would put the crude and products line total only in the 4,500-mi. range.

And although it seems likely that new projects will be announced as 1959 progresses, it's rather improbable that more than a few will add significantly to the combined mileage of the projects that have already been announced.

Next year's gas line construction is easier to figure. The way things stand now, the nation's gas transmission network may very well gain as much as 6,500 mi. in 1959, while gas-gathering-line mileage grows by 2,300 mi.

That's the way the American Gas Assn. now sizes up the coming year's gas-line construction. AGA estimates that only 6,300 mi. of main transmission lines will be built in 1958, compared with 5,200 mi. last year. And the association puts new gathering-line mileage at 3,100 mi. this year, more than double the 1,500 mi. of such line built last year.

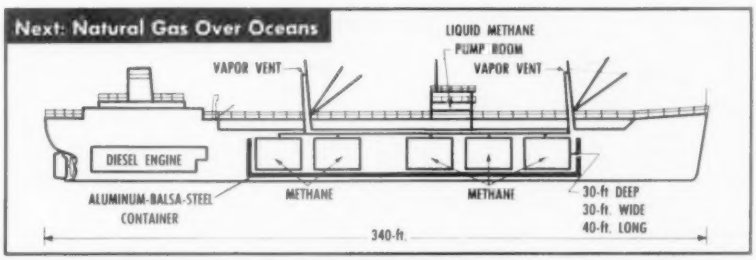
The list of companies with high-mileage gas-line building plans for next year reads like a who's who of gas transmission companies. But a few of the set projects (already certificated by the Federal Power Commission) rate special mention:

Houston Texas Gas & Oil Corp.'s Texas-to-Florida line, due for completion by mid-1959; Natural Gas Pipeline Co. of America's plan to expand its Southwest-to-Midwest system; and Southern Natural Gas Co.'s new expansion of its southeastern mainline system.

However, it is possible that major proposals now awaiting Federal Power Commission action, or still to be submitted to FPC, will raise the 1959 mainline construction figure.

For instance, there's a bushelfull of proposals to bring gas to California (PW—Oct.17'58,p15), still uncertificated, and not included in the "definitely under construction" column for 1959. It's possible that one, perhaps even two, of these lines will be approved and under way before the end of 1959.

NEWEST OIL TANKER, 70,700-ton "Princess Sophie," will be launched this weekend and then used to carry Middle East crude over the 12,000-mi route to U.S. West Coast.



FIRST NATURAL GAS TANKER, the "Methane Pioneer," has design similar to this. If its 1959 maiden voyage is successful, vast new markets will open to gas.

Gas Will Join Oil Moving Overseas

For the first time, tanker news in 1959 will have to cover the developments not only in transoceanic shipment of crude but also in the long-distance overwater movement of natural gas.

There will be plenty of importance to say about both kinds of shipments.

Oil tankers will still make most of the news, because there's still plenty to be said about tankers like the "biggest merchant vessel ever built in a U.S. shipyard," the 70,700-ton "Princess Sophie," which will be launched Nov. 15.

The new ship (above) is the latest addition to Spyros Niarchos's tanker fleet. Some 860 ft. long, and with a beam of 115 ft. and a loaded draft of 44 ft., the ship is too big to pass through the Panama Canal even when empty, and too big to negotiate the Suez Canal when full.

The "Princess Sophie," named after the elder daughter of Queen Frederika of Greece, who will sponsor the ship at its launching, will carry up to 643,000 bbl. of crude from the Middle East to West Coast U.S. refineries, making about six such deliveries a year.

The ship has a top speed of 17 knots.

The brand new "Princess Sophie" is typical of many of the ships now being delivered for "half-way-around-the-world" crude service.

Not long ago, PETROLEUM WEEK was told by the marine manager of a major oil company that "the long long-distance tanker service today demands that you build just about the

largest tanker your shipyard can put together."

The "Princess Sophie," although the largest vessel put together by a U.S. yard so far, doesn't rival the size of some crude tankers already planned for both U.S. and foreign yards.

In fact, D. K. Ludwig is well along in his construction of a 104,000-ton tanker in his Kure (Japan) shipyard.

Nevertheless, the more sensational tanker news is coming from the experimental tanker movements of methane now being carried on by the newly outfitted "Methane Pioneer."

The "Pioneer" is the ship recently made ready for experimental movement of methane over the oceans, after almost a year of work in converting it from dry cargo service (PW—Dec.20 '57,p47).

The ship, owned jointly by the British Gas Council and Constock Liquid Methane, Ltd., is now undergoing sea trials "in and around the Gulf of Mexico."

The trial runs are expected to take three months. Then the "Pioneer," if ready, will sail from Lake Charles, La., on a three-week voyage to Great Britain, arriving there for what her owners call the "first marine transfer of liquified gas for commercial purposes."

Constock Liquid Methane (owned by Continental Oil Co. and Union Stockyard & Transit Co., of Chicago) has been understandably tight-lipped about the vessel's design. Nevertheless, several of its features are known:

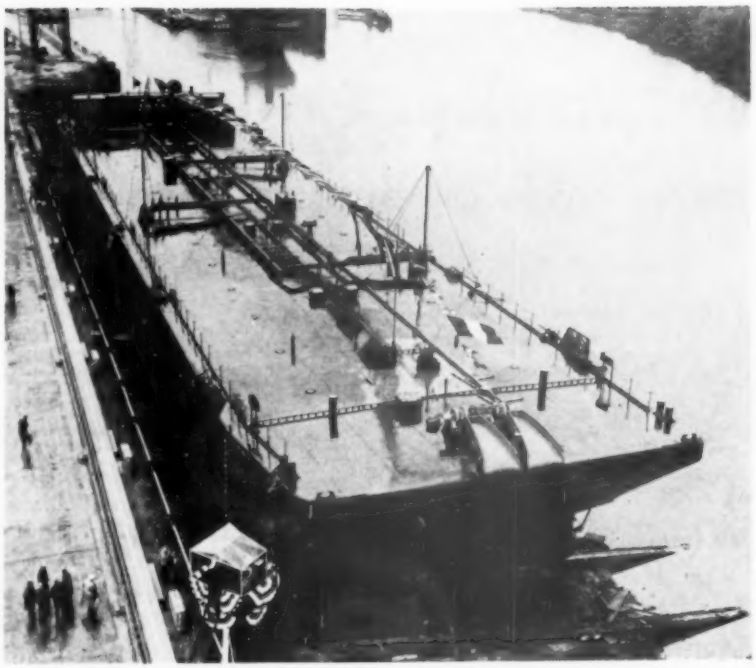
The 340-ft. ship is expected to carry about 2,100 tons of methane—33,000 bbl. when liquefied—when fully loaded. The cargo will be stored in five tanks, each about 40 ft. long, 30 ft. wide, and 30 ft. deep. A "container" for the methane tanks is made of an aluminum welded tank jacketed with about 12 in. of laminated balsa, and steel exterior.

The methane, cooled to about minus 260F before it liquefies and is piped into the storage tanks, will be kept under pressure throughout the voyage.

Less than 1% evaporation is expected during the three-week initial voyage.

The excitement generated by the "Pioneer's" experiments is well-founded; such shipments could result in an overseas natural gas transportation system of large proportions.

Great Britain is by no means the only country inaccessible to overland delivery of natural gas that has expressed interest in receiving it by tanker. If ships like the "Pioneer" can deliver the gas economically, the oil and gas industry will have opened a new, important chapter in its history.



WORLD'S LARGEST BARGE, launched recently at Houston, can carry up to 65,900 bbl. Hess, Inc., will use it instead of several 20,000-bbl. barges.

Is the New Giant First of Many?

Does oil transportation's future hold more barges like the "world's largest," a 65,900-bbl. barge just launched by Hess, Inc? Could be.

Until the launching of Hess's new "Ethel H" late last month, a 20,000-bbl. non-self-propelled barge was generally held to be "plenty big enough" for any and all oil barging jobs.

Now Hess has a lot of other oil bargers wondering whether his giant might not be applicable in their operations.

Hess, an East Coast independent refiner and marketer, will use the barge to move crude and products on the East Coast and to lighter supertankers in New York harbor.

H. W. McCollum, vice-president of Hess Terminals Corp., says the barge was chosen as an alternative to building a pipeline to serve the company's new Sewaren (N.J.) refinery. The plant does not have deep-water docking facilities, and therefore gets its supertanker-delivered crude only through a barge relay system.

Use of the 65,900-bbl. barge, instead of the usual practice of sending a few 20,000-bbl. barges out to the delivering tanker, will speed operations considerably, Hess feels.

The same principle of "sending a man to do a man's work" applies in East Coast crude and cargo shipments, according to the Hess thinking.

Other companies operating under similar circumstances are taking another look at the advisability of using one such large craft in place of several smaller ones.

The new barge's size made necessary several unusual design features.

For instance, the "Ethel H" will have air-operated mooring winches to facilitate tying up at pierside. Self-propelled barges and seagoing tankers have used such winches in the past, but the air-operated winches on the "Ethel H" are believed to be the first on a non-self-propelled barge.

The new barge also has four air-operated hose derricks, and will be able to discharge her cargo at the rate of 10,000 bbl. per hour. The barge's three diesel-engine-driven cargo pumps will permit it to discharge 2,450 gal. per minute at 125 psi. pressure.

The barge's 12-in. cargo piping system has been designed for split-cargo handling. All cargo compartments are equipped with heating coils, and the "Ethel H" has two independent ballast tanks to control trim.

The barge was built at the Houston yards of Bethlehem Steel Co.'s shipbuilding division.

Why do Canadian spreads coat with Polyken tape?

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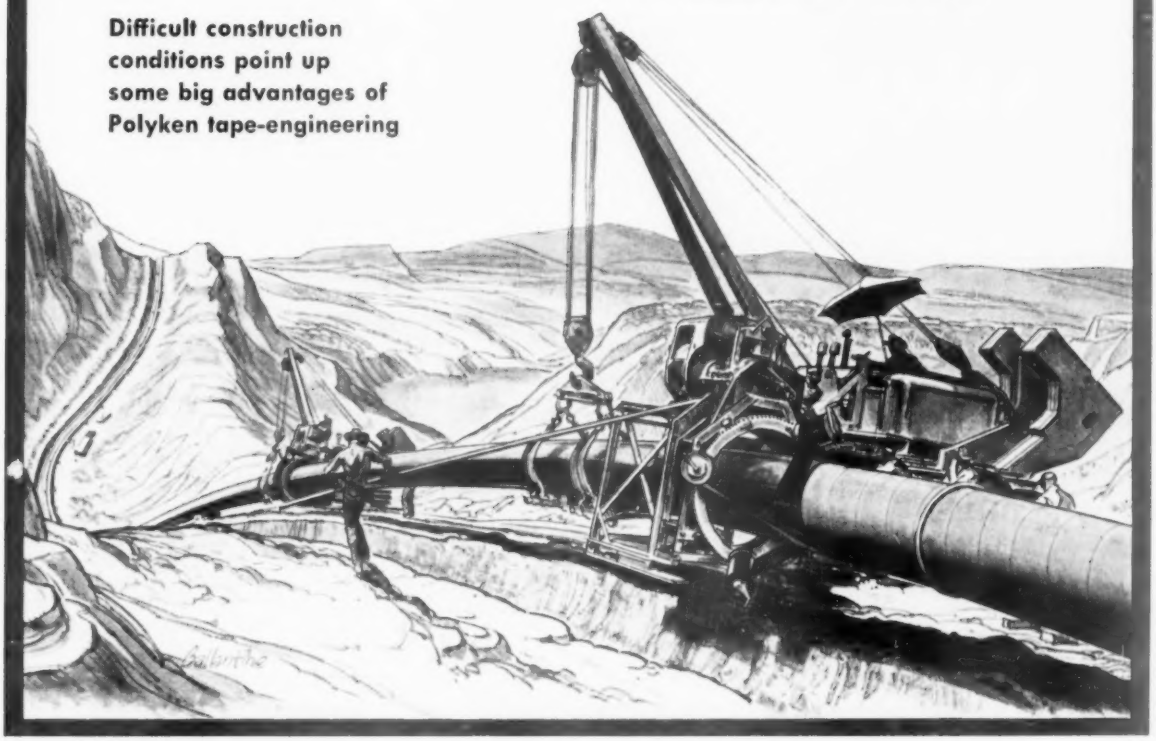

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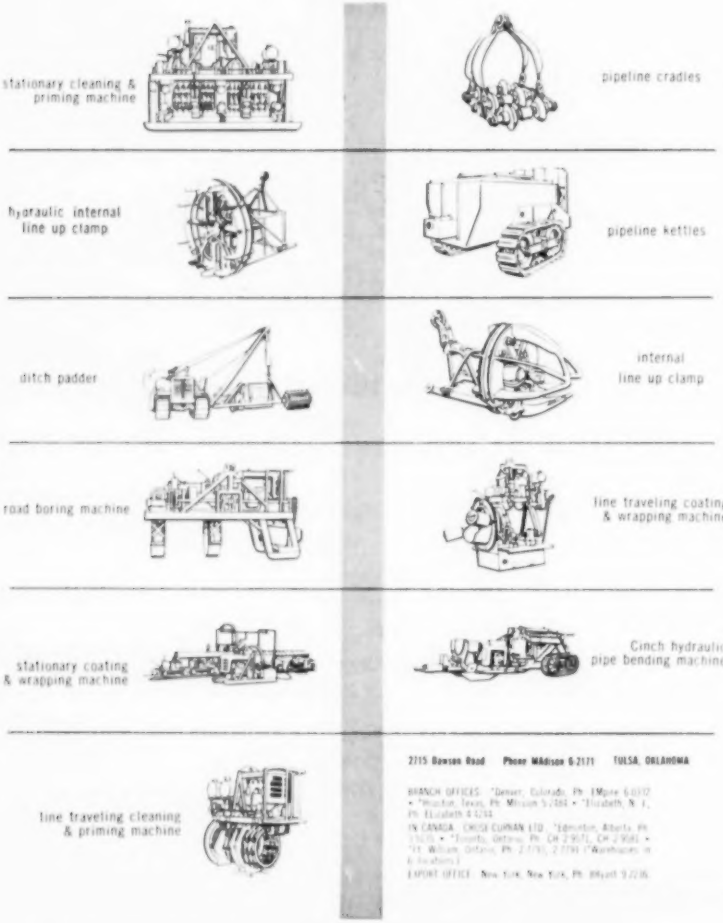
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Rail Tank Cars

Oil's Cars Grow

Oil transportation will have at its disposal more tank cars in 1959 than ever before. And the cars are getting bigger, too.

There's no denying that tank car transportation of crude and products has fallen off sharply since World War II; in 1942 railroads moved about 20% of all the crude and products transported in the U.S., while next year the rails may carry as little as 3% of this total (page 101).

Nevertheless, there's little chance that oil transportation will develop to a point where it can do without tank cars. The fall-off in petroleum shipments by tank car has been mostly in the long-distance trade, in which pipelines have often proven to be a more economical alternative. Local tank car shipments of crude and products remain strong, and it is in this service that the tank car's future lies.

More, Larger Tank Cars

	Total available	*Number in crude, products service*	*Average capacity (gal.)*
1950	116,000	81,000	8,900
1957	163,059	96,074	9,350
1958	168,182	96,101	9,500

Source: Assn. of American Railroads, National Petroleum Council.

Here's how tank car manufacturers, owners, and users are preparing for that future:

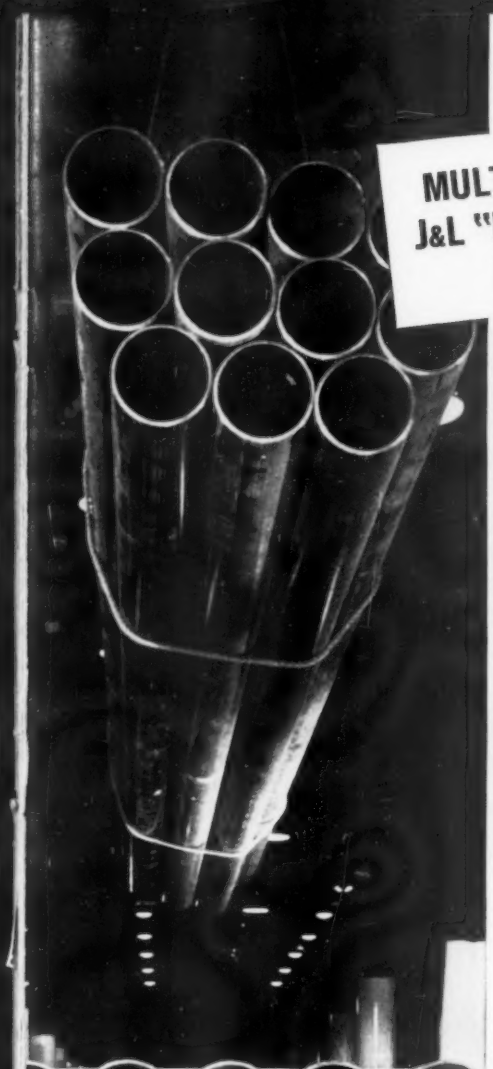
There's a gradual, annual increase shaping up, both in the total number of tank cars available, and in the number of such cars in crude and products service in the U.S.

The National Petroleum Council, when it took its sweeping look at petroleum transportation late last year, found that in early 1957 there were some 163,059 all-purpose tank cars available in the U.S. Of these 96,074 cars were in petroleum service.

New figures compiled by the Assn. of American Railroads (NPC's principal source last year) show that by early 1958 these totals had increased to 168,182 total tank cars, and 96,101 tank cars in petroleum service.

For a better perspective: In 1950, there were only an estimated 116,000 tank cars in the national fleet, and oil transportation was using only 81,000 of them.

Tank cars aren't growing only in



MULTIPLE-TESTED J&L "ELECTRICWELD" LINE PIPE

J&L's 12¾-inch Electricweld line pipe was used in 22 miles of this Cherokee Pipe Line Company line.

"J&L Electricweld pipe bends readily to contours, is easy to weld"

. . . reports Pipe Line Service Company

Twenty-two miles of J&L's 12¾-inch O.D. Electricweld line pipe were installed by the Pipe Line Service Co., Seminole, Okla., in this line for the Cherokee Pipe Line Co.

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Electricweld line pipe is produced by Jones & Laughlin, an integrated steel company, under most rigid quality controls. Weld area of the steel is blasted with steel grit under 100 psi in a "Vacu-Blast" unit to clean the surface for perfect contact with the welding electrode.

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J&L STEEL

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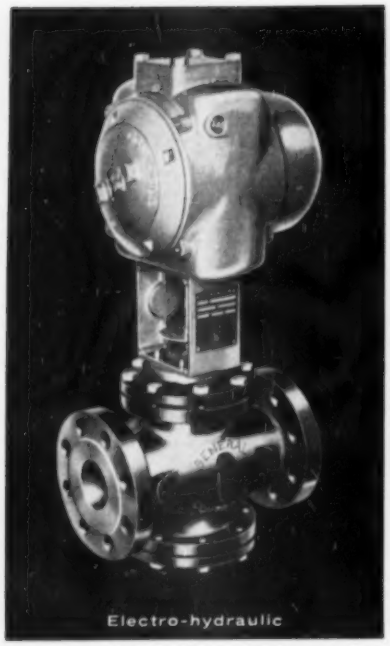

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number. Their average size, which has been rising slowly for several years, may be on the verge of a whopping increase.

National Petroleum Council studies show that the average tank car capacity rose from 8,900 gal. in 1950 to 9,350 gal. in 1957.

But a new stimulus to this growth—the supersize tank car, with capacities up to 20,000 gal.—came on the scene in late 1957 (PW—Sep.20'57,p58), and has already made itself felt. By the end of this year, average tank car capacity may well be in the area of 9,500 gal.

And the effect of the outsized cars won't stop there. As more of them are absorbed into the nation's tank car fleet—and doubt that the big cars will catch on seems to be waning (PW—Oct.17'58,p37)—the average capacity figure can be expected to spiral upward.

Tank Trucks

Goal Is Efficiency

Look for increasing emphasis on easy-to-clean and easy-to-inspect features in the designs of upcoming tank trucks.

The newer tank designs—and those on the way—make it possible to carry out the necessary periodic inspections and cleaning much faster than in the past.

A series of openings at the top of the tanks—one of the newer models has nine 18-in. openings—allows for such speeded-up operations.

The reason: These features dovetail with the current stress tank truck operators are putting on increased efficiency.

Capitol Tank Lines, Inc., which recently bought a whole fleet of this type of equipment, feels that the equipment will "result in cleaner fuel, reduced labor costs, and faster service to our customers."

"Because of the new sanitary baffles and the location of inspection domes between baffles," a Capitol spokesman points out, "the need to sample and flush each tank before loading is virtually eliminated.

"This fact alone means considerable savings to our customers by greatly reducing fuel loss."

Furthermore, Capitol feels that the new tank design "eliminates the formation of rust and other foreign material, reducing the need for costly and time-consuming strainer cleaning."

Roundup

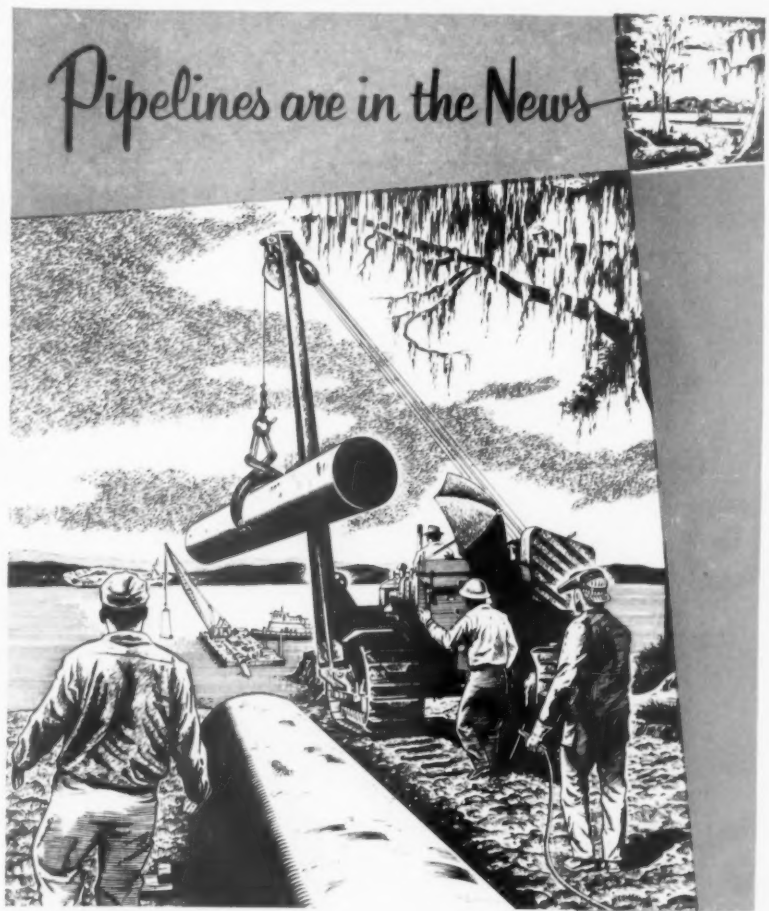
Pipelines in the Lead

New figures on the changing oil transportation picture show: In 1957, pipelines lost ground for the first time since 1950; water carriers reversed an eight-year trend and grew stronger; tank trucks continued to increase their share; railroads continued to slip.

The Committee for Oil Pipe Lines has just made available its annual study of how U.S. crude and products get to their markets. Although the committee's newest edition reports on movements only through 1957, it gives some indication of oil transportation trends for this year, next year, and beyond.

In 1957, "total crude and products carried in domestic transportation" added up to 1,019,854,162 net tons, or 0.49% more than the 1956 total of 1,014,930,276 net tons.

Pipelines now move about 43.25% of total crude and products carried in domestic transportation, according



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to the new report. In crude alone, pipelines carry 76.01% of the U.S. total. In products, the pipelines carry 20.19% of total.

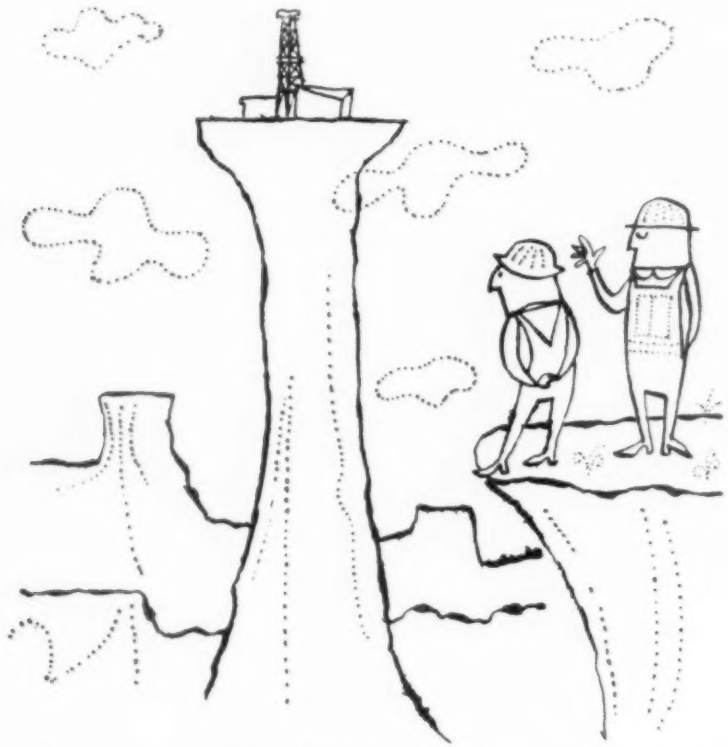
However, the current pipeline slice of the oil transportation pie is a bit slimmer than a year ago. Then, pipelines carried 43.49% of crude and products combined—77.50% of crude, and 19.14% of products.

The water carriers' gain brings their share of total oil shipped to 29.40%, the committee says.

The current figure is up only slightly from 1956, when water carriers' percentage was put at 29.34%. However, it is up—and that hasn't happened since 1950.

Tank trucks now move 23.76% of the U.S. oil shipments, according to the committee. This compares with the 23.25% of total tank trucks moved in 1956. It's been 11 years since the tank truck share of oil transportation failed to grow.

Railroads have now slipped to a point where they move only 3.59% of U.S. oil shipments, the committee reports. The current decrease—from 3.92% a year earlier—follows a 14-year tradition.



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What's New
IN TRANSPORTATION

Transwestern Pipeline Co.'s plan to bring West Texas and Four Corners natural gas to California will come before the Federal Power Commission on Dec. 15.

Transwestern plans about 1,800 mi. of various-sized line, and eight compressor stations with a combined horsepower of 40,940, to deliver up to 350-million cu. ft. of gas daily to Pacific Lighting Gas Supply Co. (PW—Feb.28'58,p17).

The Transwestern plan is only one of several current plans to bring gas to the lucrative West Coast market (PW—Oct.17'58,p15).

•

Shell Pipe Line Corp. has let contracts for construction of its 90,000 b/d common carrier crude line from the Mississippi River delta to New Orleans.

The line is now scheduled for completion in early 1959.

Glaser Construction Co. will lay about 50 mi. of the line; Houston Contracting Co. will build about 65 mi. of the system; J. Ray McDermott & Co. will build major Mississippi River crossings; Delta Engineering Corp. will construct four pump stations; and Station Construction Co. will build the Norco terminal and Loutre Junction facilities.

•

Arkansas Louisiana Gas Co. plans a $15-million expansion within Arkansas.

Major part of the plan is a new 130-mi., 16-in. line from Hot Spring county to Helena, on the Mississippi River. The line is scheduled for completion in 1961.

•

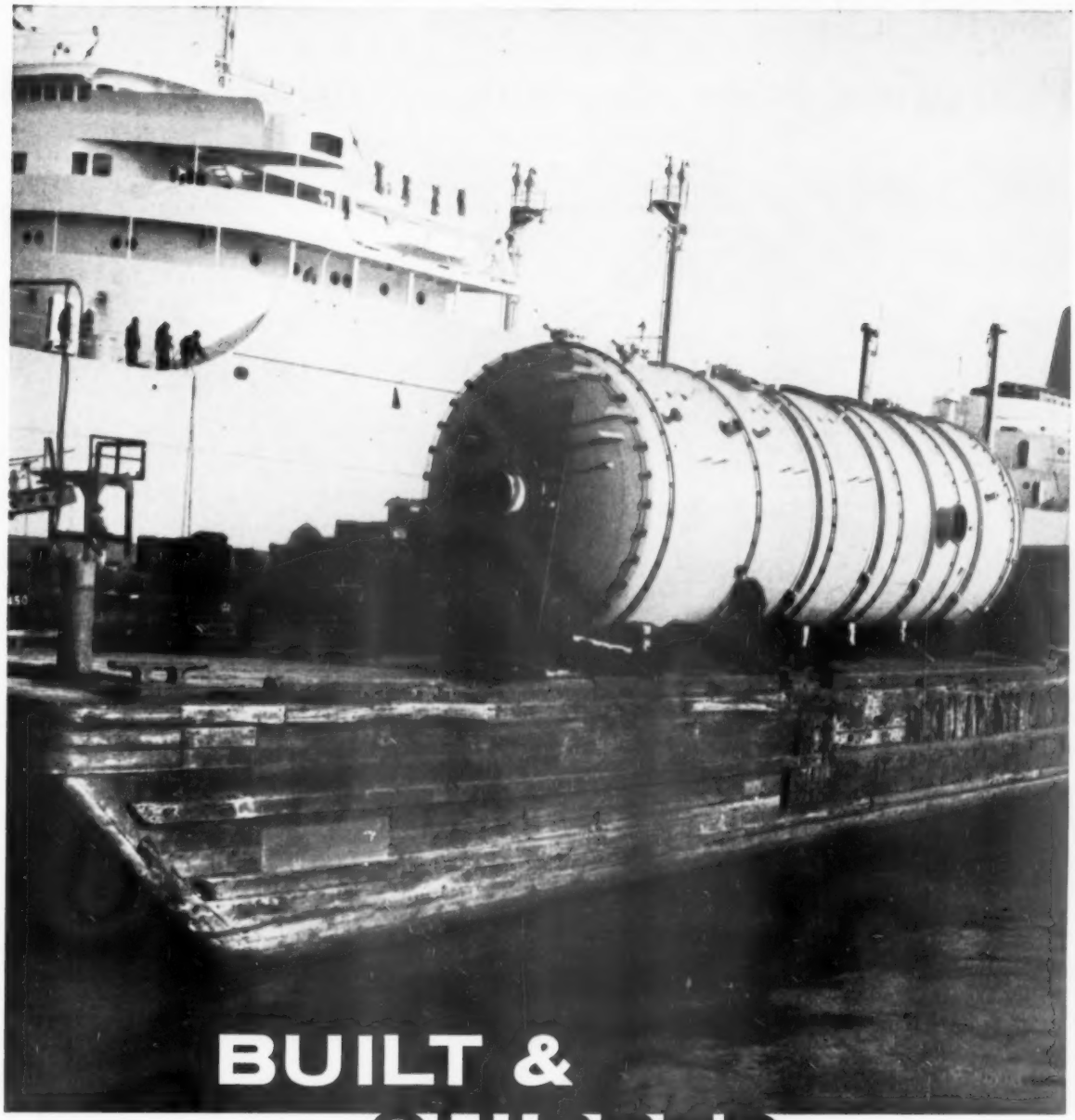
Northwestern Utilities, Ltd., has just put into operation its new 70-mi. gas line from the Pembina field to Edmonton, Alta.

The line is moving about 50-million cu. ft. of gas daily from 2,000 Pembina wells to central Alberta consumers. The gas used to be flared.

•

Quaker State Oil Refining Corp. has taken over Sinclair Pipe Line Co.'s Allegany County (N.Y.) system.

The system consists of over 300 mi. of 2-in. and 4-in. crude lines centered around Bolivar and Wellsville, N.Y.



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Petrofina Sees Mideast Terms 'Costly'

"Any oil found under the new terms in the Middle East won't be cheap oil."

"I expect strong competition from newcomers who have found substantial quantities of oil, but have no markets."

"Russian oil exports are a serious threat."

"The U.S. is the best of all markets. We have no intention of stopping where we are."

Any oil found under the "75-25" and other new Middle East oil terms would be "costly and hard to market," according to Laurent Wolters, managing director of Belgium's internationally expanding Petrofina.

Petrofina, which operates in Europe and Africa—as well as the U.S. and Canada, is not interested in Middle East concessions, Wolters told PETROLEUM WEEK last week.

Any oil found under the new concession terms won't be "cheap oil," Wolters pointed out. It will not only be much more costly than existing Middle East production, with which it would have to compete, but Wolters even estimates that it would be "more costly than Venezuelan oil is today."

Even the long-established big companies in the Middle East, he says, found it "not so easy" to find markets for their low-cost oil.

"What's the use of finding oil under the new, higher terms," Wolters asks, "if you can't sell it?"

Marketing in the Eastern Hemisphere and Latin America, Wolters believes, will be particularly rough. One reason is the serious threat of Russian oil exports, which Wolters expects to top the 100,000 b/d mark this year.

"The Russian sales policy is one that cannot be met by private companies," says Wolters. "Not only do the Russians sell oil at low prices, but they offer to buy—at world prices—the excess production of whatever other commodities that country cannot sell." And with production and consumption controlled, Wolters believes there is virtually no limit to what they can choose to put onto the market.

"With the rapid production gains the Russians are talking about, a lot of what's available could find its way to world markets."

Newcomers who have found large quantities of oil, but have no market outlets, will also make competition "rough."

"With the doors to the U.S. virtually closed to substantial imports of new crude production," Wolters says, "there is strong competition from these companies for available markets. You can't expect them to keep their oil in the ground."

"Price-cutting," Wolters maintains, "is not the answer to this problem."

"Personally," he says, "I think that if principal oil companies arrive at the conclusion—which is clear in my mind—that price-cutting won't help in holding markets, there would be no reason for the disorderly situation we have today."

West Germany is a good example of a booming market that has attracted newcomers. Petrofina, itself, with a refinery under construction, is one. The established companies there are trying to hold their percentages of the market. "But," says Wolters, "this is impossible. The best thing you can do is to hold your gallonage."

On the other hand, the Petrofina director feels that the U.S. is the best of all markets.

"Not only is it the largest in the world," he says, "but a good part of production is controlled by the states, and imports are virtually controlled by the government. This situation will exist for some time."

As a consequence, Wolters believes inventories of crude and products can be kept at a reasonable level. "And," he says, "it is in the hands of the major companies to make this market profitable as it should be, and enable the industry to make the money it needs."

Petrofina is currently going through a "digestion" period in the U.S. For the time being, it is organizing its acquisitions and coordinating its policies.

American Petrofina, which was organized just three years ago, now has a production of about 10,000 b/d of oil plus about 41-million cu. ft. a day of gas from holdings in a belt stretching from Nebraska to Texas and Louisiana. Refining capacity is about 50,000 b/d.

Petrofina has about 11,000 sales outlets in 17 countries. About 1,300 are in the U.S.

However, Wolters adds, "we have no intention of stopping where we are."

"Events of the last year or so," he says, "confirm our opinion that the U.S. is the best of all markets. Taking everything into consideration, we have a definite plan for expansion—in an integrated way."

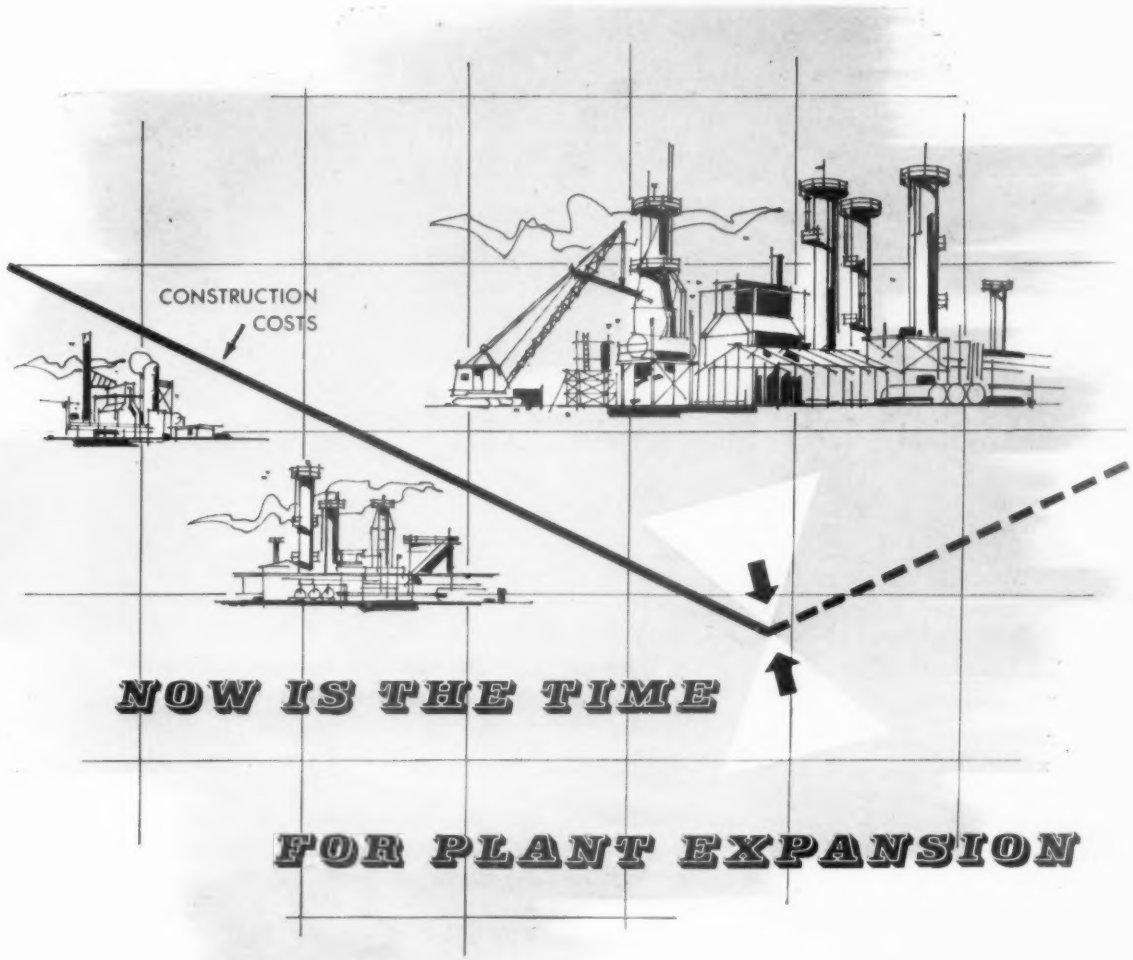
"This does not mean we are forgetting the rest of the world," Wolters says. Petrofina is now expanding in Europe: It recently moved into the German market, and it is also moving into Scandinavia, where it already sells fuel oil in Sweden.

"We shall start marketing in Norway in 1959, and are now forming Norske Fina. There is also a chance Sweden may be developed for a products market."

Except for Denmark, Petrofina covers most of Western Europe. "We soon hope to have a marketing quota in Portugal, where we now sell only lube oils," Wolters notes.

Petrofina made its first step into South America last year, when it acquired a small interest in one of the new Venezuelan concessions. More recently, it showed interest in an Argentine oil development contract, though it has now withdrawn its original letter of intent.

Africa is one of the few areas outside



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of North America where Petrofina has several exploration and production interests.

At present, Petrofina is holding its production in Portugese Angola to local consumption levels, Wolters says. A small 2,000 b/d refinery has been set up at Luanda for that market. Plans for expansion of the refinery are in abeyance.

The company is producing from three structures: The largest is at Benfica, another is at Luanda, and a new structure has been uncovered at Cacuaco.

"The oil found to date," Wolters says, "is of limited quantity, but commercial for the local market. We are hopeful of finding a large oil field though. Angola is promising territory."

Petrofina also has some expanding production in Egypt.

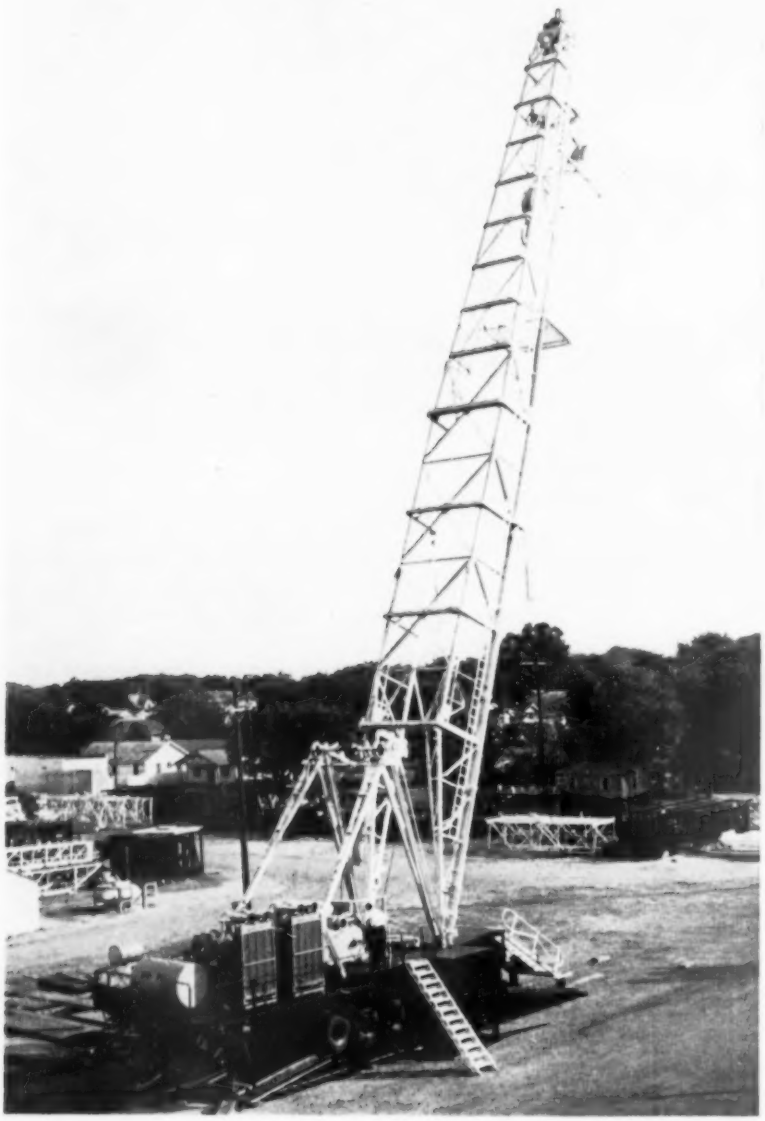
The Belgian Congo is Petrofina's next exploration target in Africa.

A new syndicate, including Petrofina, a Belgian diamond company in which Newmont Mining has an interest, and some local firms, has been formed to carry out exploration on oil and mineral rights in the coastal area.

"We are also looking at the Sahara," Wolters says. "Discussions are under way with the Bureau de Recherches de Petrole, and it is possible we may go in."

Petrofina welcomes the European Common Market, Wolters concludes. "We feel it will enable us to export certain products more rationally from country to country. Of course, problems exist, and the hardships will have to be worked out."

Loffland Ships Ten Rigs to Argentina



The last of ten new Loffland Bros. rigs will be on the way to Argentina by the end of this month, to drill for Pan American International Oil Co.

They'll be used in the Comodoro Rivadavia area on the three proved and semiproved structures assigned to Pan American under its oil development contract with Yacimientos Petroliferos Fiscales. The contract calls for drilling 50 wells in the first year.

The first three complete drilling units were shipped from Houston at the end of October, just 30 days after Loffland was assigned the drilling contract. Another four are being shipped this weekend, and the last three within 15 days.

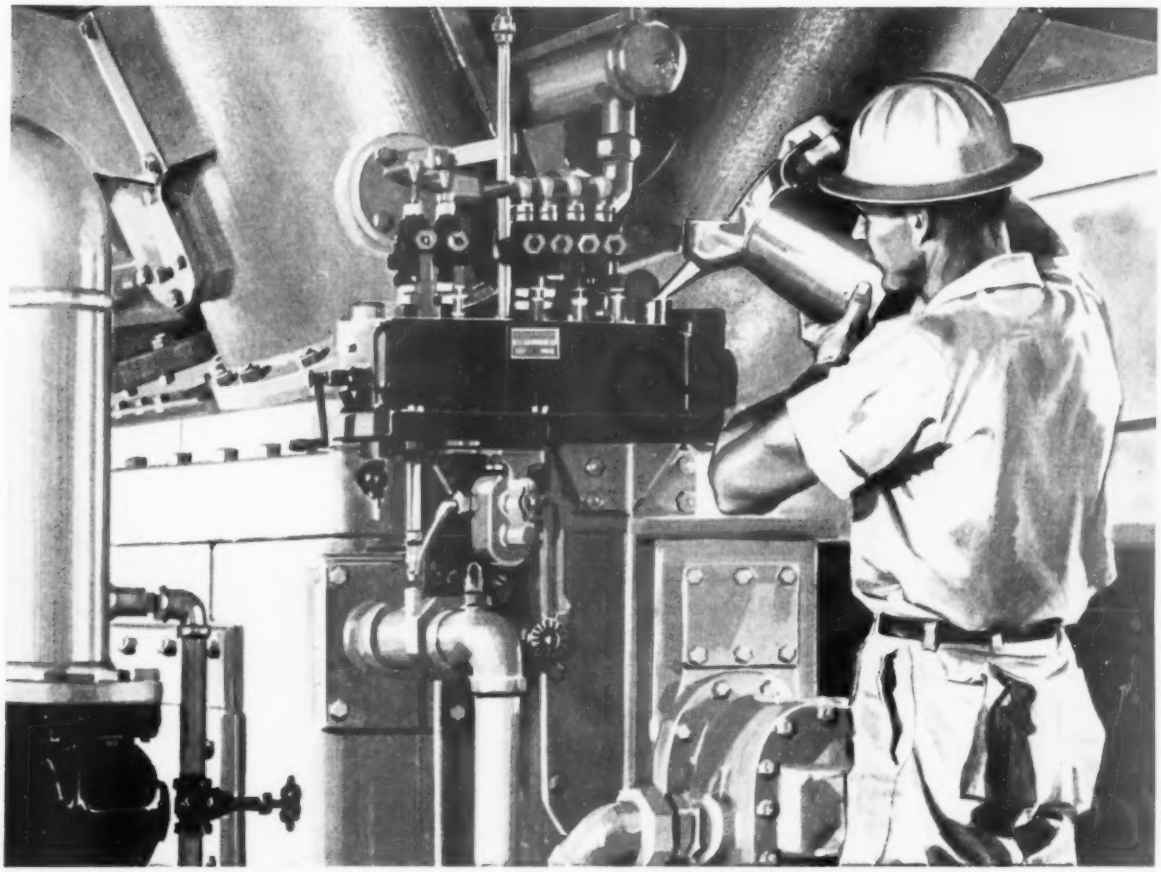
All were supplied and equipped by the Mid-Continent Supply Co.

The rigs, specially designed and equipped for operation in Argentina, are all diesel-powered, fully portable units (picture, left) mounted on dual trailers.

They were manufactured in Tulsa by Unit Rig & Equipment Co., and equipped with 126-ft. Lee C. Moore masts. They will be used to drill to 6,000 ft., though they are capable of drilling to 9,500 ft.

Loffland will use Cummins engines throughout its operation, so that all parts will be interchangeable.

Each rig is equipped with two 500 hp. engines. Pumps and Emsco D-700 and D-500. The draw works are Mid-Continent U-36-A. A torque tube will be used between the draw works and D-700 pump, thus saving the cost of extra engines.



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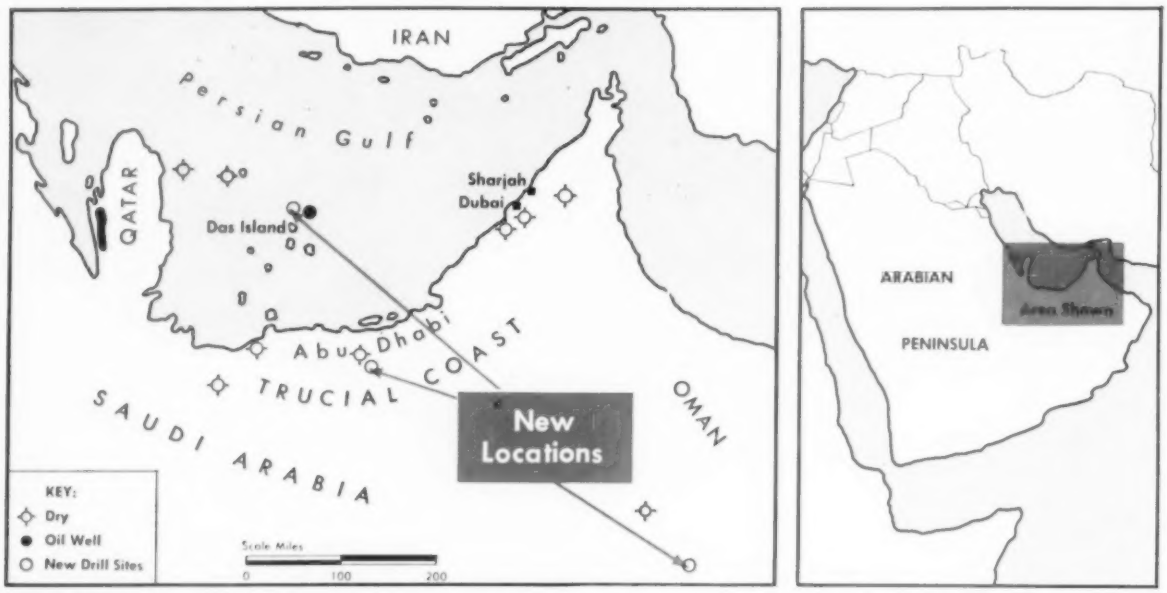

THREE LATEST TESTS in Southeast Arabia are set for widely scattered locations, onshore and offshore. Will they provide . . .

New Clues to Southeast Arabian Oil?

Results of three new drilling tests at widely scattered locations at the southeast end of Arabia—two onshore, one offshore—will be watched for new clues to oil prospects in the area.

The only potentially commercial oil find was made offshore this year, in the third wildcat drilled south of Qatar in the Persian Gulf.

Onshore, the oil prospects remain more elusive. Seven wildcats have been drilled over the past few years, six of them in the Trucial Coast sheikhdoms, and one farther southeast, in neighboring Oman.

The only one that found a show of oil was at Murban, in the Sheikhdom of Abu Dhabi.

One of the new offshore tests will be spudded shortly in Abu Dhabi, where a second try will be made at Murban (map) by the Iraq Petroleum Co. associate that holds the onshore concessions for the Trucial Coast sheikhdoms.

The test may provide the answer to the puzzling first Murban wildcat, the "mystery well" that found oil in 1953, ran into mechanical difficulties, and then failed to test oil when reopened.

The company recently abandoned its sixth Trucial Coast wildcat, in the sheikhdom of Sharjah, where it plans to abandon its concession. The test was carried to 12,916 ft. at Juweiza (picture), 50 mi. inland from the beachhead.

LATEST TRUCIAL COAST WILDCAT was recently abandoned in Sharjah, and an Iraq Petroleum Co. associate plans to abandon its concession for this sheikhdom.

The other new onshore wildcat is now below 10,900 ft. some 200 mi. south of the Trucial Coast, in Oman.

This test, No. 1 Ghaba, is the second drilled in Oman by an IPC associate. The site is 75 mi. southeast of No. 1 Jebel Fahud, which was abandoned last year at 12,235 ft.

The new offshore test, to be spudded shortly in the Persian Gulf, will be the first appraisal well for the wildcat discovery 20 mi. east of Das Island which may have established the first oil field in the southern end of the Persian Gulf.

The new well will be spudded two mi. west of the No. 1 Umm Shaif discovery, in which British Petroleum Co. is now completing tests. On earlier tests, the well flowed for a limited period at the rate of 2,400 b/d of 40-gravity crude with 1.4% sulfur content. Results of later tests have not yet been disclosed.

The discovery well was the initial wildcat on the offshore concession held by Abu Dhabi Marine Areas, Ltd. (owned 3/4 by BP, 1/4 by Cie. Francaise des Petroles).

Two previous offshore dry tests in this general gulf area were drilled by Shell, east of Qatar Peninsula.

The other offshore finds are in the northern half of the Persian Gulf, close to Saudi Arabia, in Arabian American Oil Co.'s big Safaniya field, and its newer Manifa discovery.

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What's New / AROUND THE WORLD

Oil Strike in Papua

PAPUA—The first oil producer—after a 20-year, $67-million oil hunt—was announced this week by Standard-Vacuum Oil Co. and British Petroleum Co.

The well is the first success in 19 wildcats drilled in 11 years of postwar exploration on this Australian territory on the island of New Guinea.

The No. 1 Puri discovery tested at an initial flow rate of about 1,000 b/d of crude oil and condensate, but with increasing amounts of water. The well found oil-and gas-bearing limestone at approximately 7,400 ft.

It was drilled by Australasian Petroleum Co. Pty., jointly owned by Vacuum Oil Co. Pty., British Petroleum, and Oil Search, Ltd., an Australian firm. BP is the operator.

•

SPAIN—A much-improved draft oil bill to encourage exploration by foreign companies may be pushed through for parliamentary approval within the next month, according to government sources in Madrid.

The government has ordered faster progress by the committee in charge of amending the restrictive original draft, in spite of opposition from Jose Antonio Suances, influential president of the state-owned company that now controls exploration in Spain (PW—Sep.5'58,p47).

The committee has already removed the one-concession-per-company limit from the draft and extended the time limits for exploration and development rights.

•

ARGENTINA—Italy's Foreign Commerce Ministry has authorized export of 20 trailer-mounted oil drilling units to Argentina by Nuovo Pignone, the manufacturing affiliate of Italy's state-owned Ente Nazionale Idrocarburi.

An offer of the units, valued at $2½-million, was submitted to Argentina recently (PW—Sep.12'58,p50). But there is still no indication from Buenos Aires whether a contract for them has actually been awarded.

•

TRINIDAD—A wildcat believed to be the deepest ever drilled from a floating barge has been abandoned as dry at 10,814 ft. in the Gulf of Paria.

The test was drilled by Standard of California's Dominion Oil Co. Offshore Co., Baton Rouge, was drilling contractor.

•

SICILY—A Gulf Oil Corp. affiliate has a natural gas discovery on its Fiume Platani permit. A second test will be drilled on the adjoining Alimena permit to evaluate the find.

The No. 1 Montoni discovery tested about 2.8-million cu. ft. daily. It was drilled by a company owned jointly by Gulf Oil and Montecatini.

•

POLAND—Refining of 160,000 b/d of Soviet crude by 1975 is foreseen under a government plan to build a major refinery with Soviet aid.

The program calls for construction of a plant with 40,000 b/d initial

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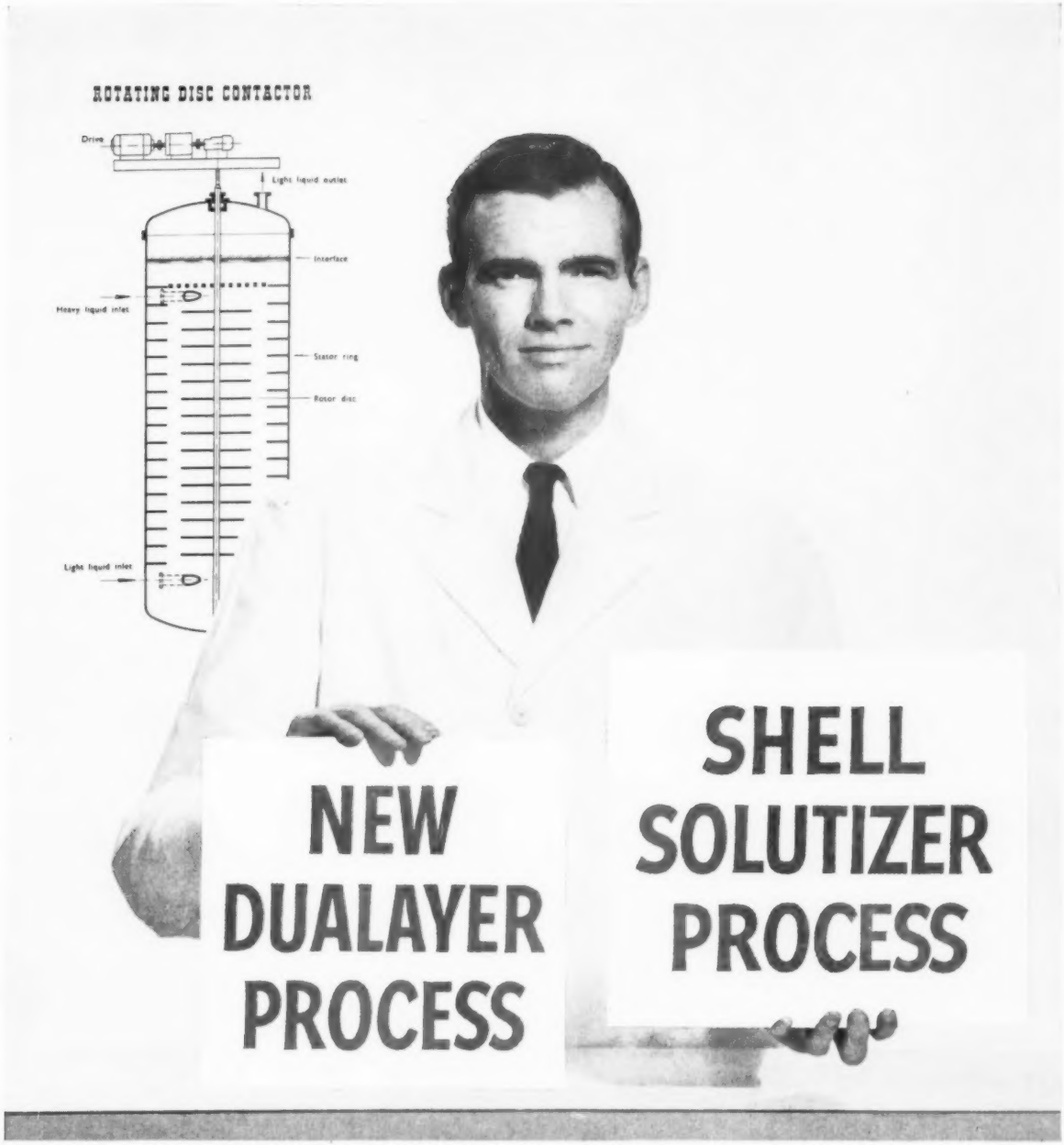

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capacity by 1963-64, to be increased in stages.

•

IRAN—The first clue to offshore oil prospects in Iran's Persian Gulf waters may be forthcoming soon from the Consortium's coastal wildcat onshore at Kuh-I-Binak (PW—Nov.15 '57,p147).

The site is in southeast Iran, 3 mi. from the offshore tract won this year by Indiana Standard under a joint venture with National Iranian Oil Co.

Drilling of the test is due to be resumed, following recovery of tools lost in the hole at 3,687 ft. The Consortium ran into trouble with it three months ago, encountering high pressures. The wildcat is expected to top the Asmari limestone—which is prolific inland, in southeast Iran—at 4,500 ft.

•

ARGENTINA—Union Oil Co. of California is starting exploration in southern Argentina under its new exploration and development contract.

Union's agreement with the government oil entity covers two tracts totaling 4-million acres in the Comodoro Rivadavia Basin. An airborne magnetometer crew is about to start a regional evaluation.

It's Only Money . . .

The rapid pace of pipeline expansion in France these days is giving contractors headaches in keeping equipment supplies up to needs.

The president of Rockwell Mfg. Co. cites this example: In order to get equipment to one job on time, a $15,000 order for pipeline valves had to be shipped by air freight to France. The cost? Almost as much as the valves themselves—$12,000.

FINLAND—Russian oil will displace 3 1/3-million bbl. of oil from Shell and Gulf Oil during the next 18 months.

The two oil companies were forced to cut deliveries by Finland's desire to decrease its large ruble holdings.

•

LIBYA—Oasis Oil Co., with two oil finds under its belt, will move two, and possibly three, new rigs into the country in 1959.

The company is now doing additional testing work on its second wildcat, the No. B1-32 Dahra, which is located 24 mi. south of its initial find, the No. 1 Bahi (PW—Oct.31'58, p11). The Bahi test is roughly 75 mi. south of the Gulf of Sirte.

When testing is completed, the company will spud a third test 5 mi. north of No. B1-32 Dahra, between the two finds.

•

WEST GERMANY—Shell's new 40,000 b/d refinery at Harburg went on stream last week.

Completion of the plant, four years under construction, boosts Shell's total refining capacity in the Hamburg-Harburg area to 60,000 b/d.

•

EAST GERMANY—A Soviet team has arrived in East Berlin to start preparatory work on a "large-size" refinery that was the central item of the recently signed 1959 German-Soviet trade pact.

The refinery will be located near the terminal of the Russian-East German pipeline, through which the Russians plan to pump about 100,000 b/d by 1965. The refinery will also signal the start of large-scale petrochemical operations in East Germany.

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Each issue contains the following information:

Refinery and Terminal Prices—For the year 1957, all price changes and monthly average lows, average highs, and average lows and highs for all petroleum products at all locations reported daily in the OILGRAM Price Service.

Tanker Rates—Average for the year and previous years of tanker rates as reported in Price Service.

Tank Wagon Prices—This section summarizes the tank wagon prices reported in the weekly supplements to Price Service.

Crude Oil Prices—This section summarizes crude oil prices reported in the monthly supplements to Price Service.

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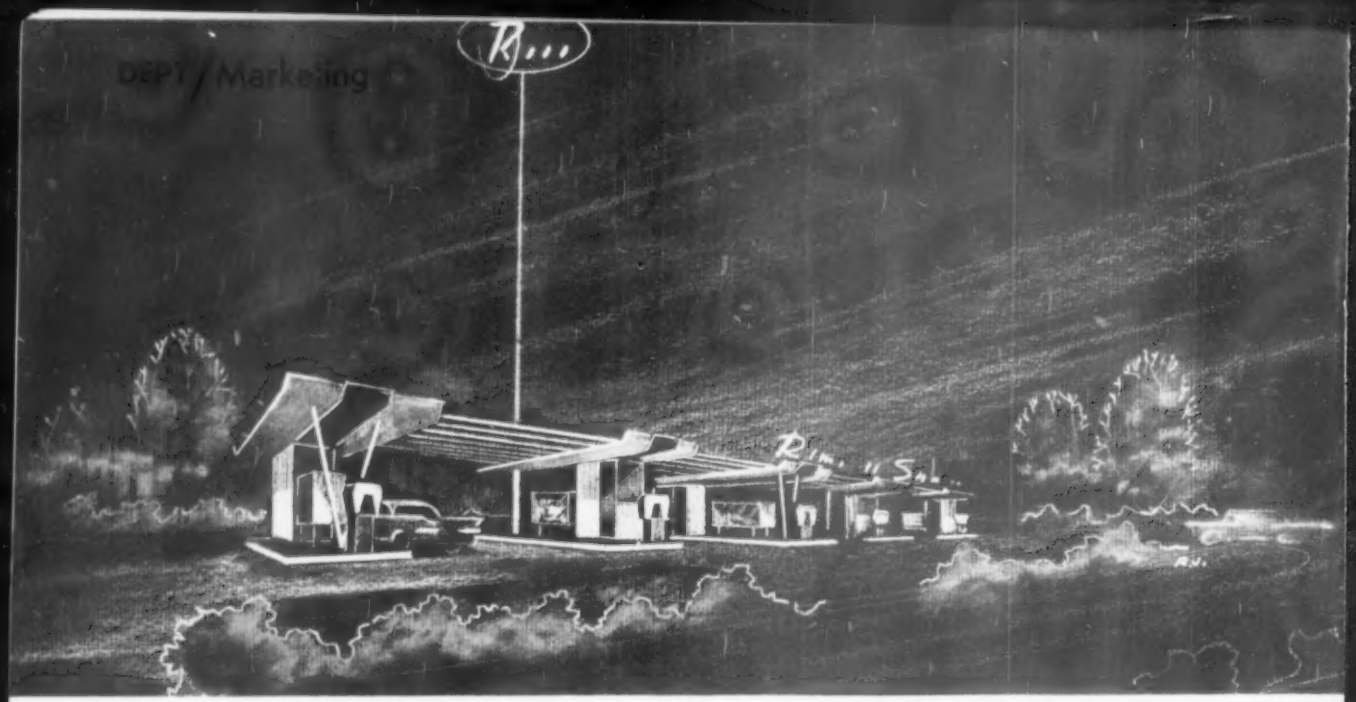
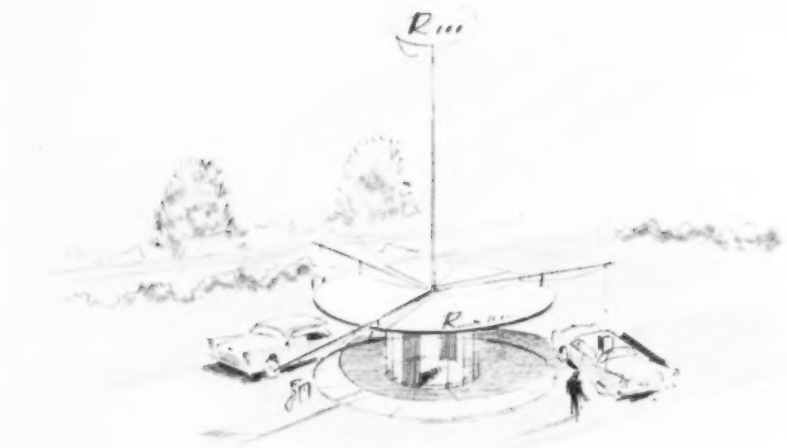
DEPT / Marketing

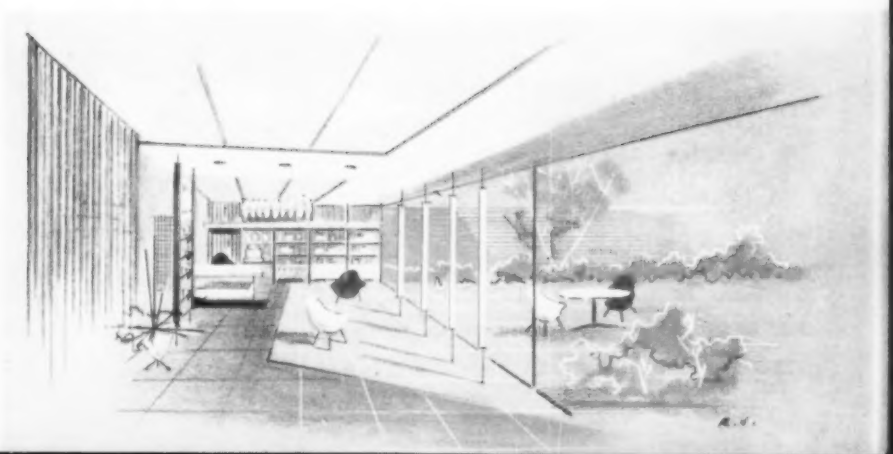


MODULAR PREFAB ISLANDS, each with a display and sales area—one design solution to the "revolution in retailing."

Station of Tomorrow: How Different



OVERHEAD PUMPS at this futuristic circular service station can be rotated into any position. Thus, the "pump comes to the motorist," rather than vice versa.



LOUNGES for customer relaxation will be a must at future highway stations. Vending machines will be an integral part of this area. Patios and adjacent picnic areas will be popular also.

Designs by
Donald Deskey
Associates

SUBURBAN STATIONS built into huge shopping centers offer a big potential for market expansion. Here is sample of multiple land use by merchants, with parking as a common denominator for all-day activity.

Will It Look?

The service station of tomorrow will be prefabricated, expandable, contractable, and more flexible—according to plans now on the drawing boards of a leading industrial design firm.

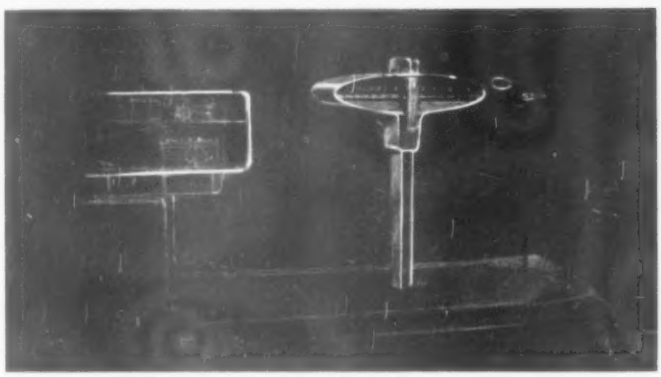
Donald Deskey Associates, which has been designing station prototypes for about 30 years, this week outlined and illustrated for PETROLEUM WEEK its concept of the service station of tomorrow.

"The ideal service station has not been built," says Donald Deskey, senior partner. "We believe that it's possible to design the ideal situation and, from there, try to engineer solutions for any problems that arise.

"There's no single approach that will assure more profits, however. Oil companies need to have a continuous study of consumer buying habits and modern merchandising methods. We're working five to ten years ahead, since it takes a minimum of two years to set up a test operation on a prototype station."

Future changes in design and methods will be so rapid-fire that oil companies will find it hard to keep up. One possible solution: a prefab portable that can be relocated at minimum expense.

The trend to prefabs is inevitable, according to Deskey. A big reason, he says, is the changing pattern in urban

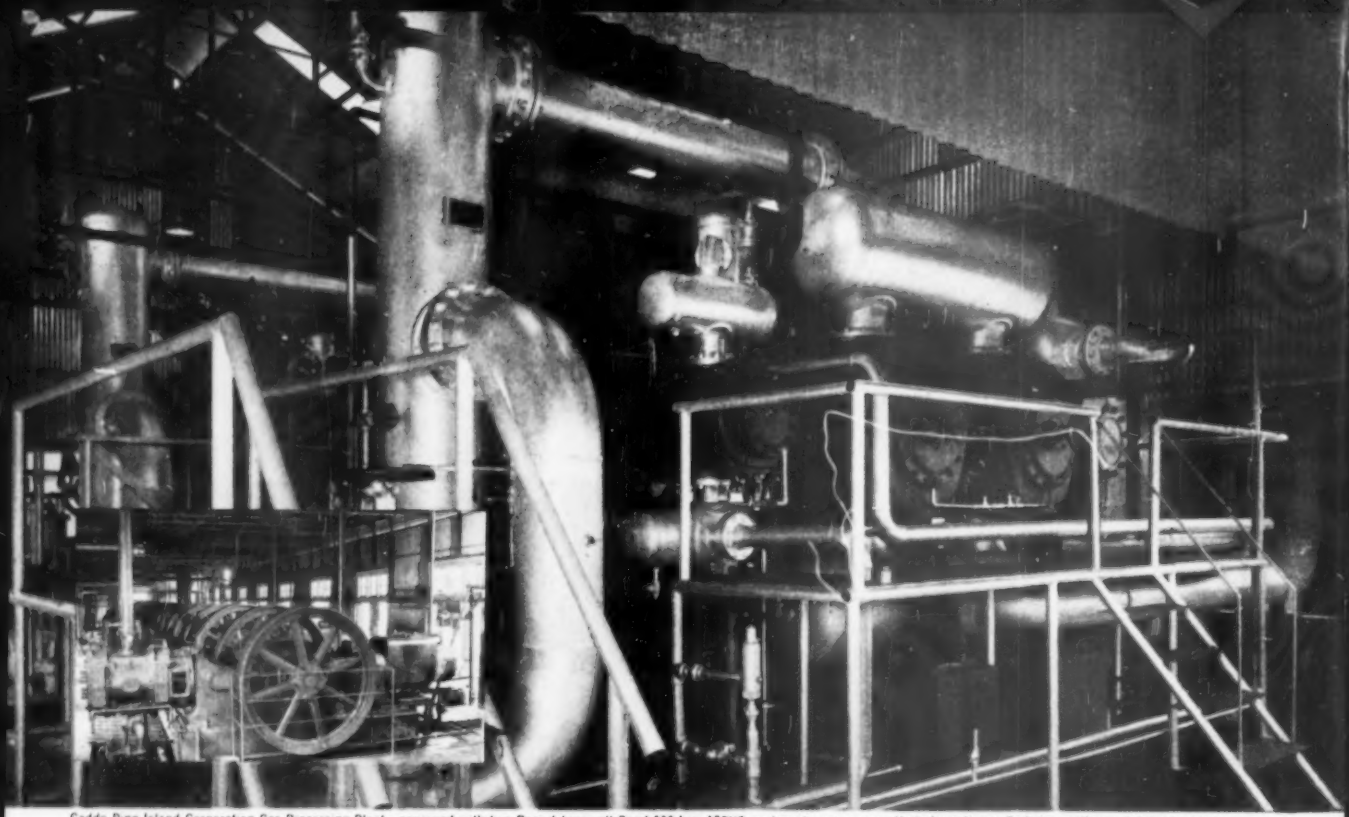


TOMORROW'S PUMP—still on the drawing boards—is one electronic unit to dispense all motor fuels and record data for centralized accounting.

DRIVEWAY SELLING will be made easier with this "merchandising pump island"—designed so that TBA displays can be easily seen from the motorist's car.

BEAIRD-INGERSOLL-RAND Packaged Compressor Plant

Lowest Cost Per Horsepower Installed



Caddo Pine Island Corporation Gas Processing Plant—equipped with two Beaird-Ingersoll-Rand 660 h.p. 12SVG packaged compressors. Units have Young Radiators with gas, lubricating oil and engine water cooling sections. Other sizes 120 to 660 h.p. Inset picture shows original horizontal compressors.

Two Packaged Compressors

DO WORK OF TWENTY OLDER UNITS

Caddo Pine Island Corporation processes flare gas from 1,000 Pine Island Field wells in an absorption plant located near Oil City, Louisiana. Picking its load up over a thirty mile gathering system, the plant was originally equipped with twenty horizontal compressor units. These have now been replaced by two Beaird-Ingersoll-Rand 12SVG 660 h. p. packaged compressors.

Using three stages of compression the packaged units pull the gas into the plant under ten inches of vacuum. It is then boosted through processing operations and returned for third stage boosting to the sales line. Up to 5¾ million cubic feet can be handled per day with final delivery pressures of 440 psi.

Installation of modern Beaird packaged compressors has increased plant dependability and lowered fuel, labor and maintenance costs. An additional savings will be realized when the field is depleted. Installation of packaged compressors has made the station almost wholly salvable.

Let Beaird engineers help you find an economical solution to your plant expansion or modernization program.

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and suburban development and the resultant relocation of important traffic arteries.

"The ideal situation," says Deskey, "would be to be able to pick up everything—including all mechanical equipment—and move it all to a new location at minimum expense. One of the engineering problems to be solved is providing storage capacity that is both portable and acceptable to local authorities. Many communities prohibit above-ground storage."

The prefab is also more flexible, Deskey contends, because various components can be designed for use on a modular basis. A minimal station can be built with the same units used for a bigger or more elaborate station. It is also possible to expand, contract, or relocate any of the various combinations.

"The prefab station also is more easily altered to meet competition, when it moves in across the street with a more exciting architecture," Deskey reasons. "Architecture as a point-of-sale device is susceptible to constant change—and this makes brick and mortar impractical. Competition is no respecter of capital investment."

Also on the horizon: a revolutionary pump that will dispense all types of fuel from a single electronically controlled unit, designed for centralized accounting.

"The cost of installing pumps has to be justified by a profitable return on each pump," Deskey observes. "You either build for peak hours and are overequipped at other times, or you don't have enough pumps to handle all the potential traffic during the rush hours. A new pump is now being developed that will make it possible to handle the peak sales hours, without the multiple cost of installing individual pumps.

"The engineering concept of such a pump has long been in the minds of both the equipment manufacturers and the oil companies. It is inevitable that the present gasoline pump—with its manual operation and complicated accounting requirements—will soon prove inadequate to the demands of high-speed servicing of the future. When this happens, the industry will produce a pump that goes beyond the present fuel-blending concept.

"This pump will incorporate into one unit dispensing equipment for all grades and types of gasoline, a device for presetting quantities, an automatic computer, and an integrated charge-plate operation. The pump will transmit to a central accounting point the entire record of the sale—providing daily sales tallies. It will also furnish the motorist with a receipt, showing

. . . and the business goes to the service stations that sell tire chains *before* the snow flies. Dealers are like most drivers . . . they wait until they're in trouble before they get the chains they need. That's bad for everybody. The car owner doesn't have his tire chains when he needs them . . . you and the dealer lose a good *profitable* sale.

New Campbell "Jiffy" Chains go on in less than a minute a wheel. No jacking or moving the car. Campbell "Jiffy" Tire Chains have the sales advantages your dealers can use to sell chains "before the snow flies."

Tire chains are one of the sweetest profit items in the entire TBA line-up, *and one of the least promoted at the dealer level* . . . unless you handle a chain line that does a real merchandising job for you. Handle Campbell Chain and you'll know that "there's no business like snow business."

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that the sale has been charged. If the customer does not have a credit card, the receipt will be used to pay at a separate booth. Thus, the island will not be tied up with change-making."

More service stations will be built into huge shopping centers to meet growing customer demand for one-stop service.

"We're seeing a major revolution in merchandising, with the flight of retailing to the suburbs," Deskey points out. "This is a great area of expansion for oil companies, if they will accept the fact that established patterns are changing.

"I firmly believe that the major companies can compete with the private-brand operators—outside the battle of the price war—if they keep up with modern merchandising trends."

Stations on the huge network of highways yet to be built will offer more merchandise and will stress customer lounges.

The highway station of tomorrow will be designed to get the motorist out of his car and into an inside sales area. There will be new emphasis on comfortable surroundings, which invite travelers to sit down and rest. Some stations will have outdoor patios or adjacent picnic areas.

Competition will demand that future station designs be unusual and exciting—and at the same time build a brand image.

"Our feeling is that if you have something exciting enough from a visual standpoint, you will automatically draw the customer," says Deskey. "That visual image must also say, unmistakably, 'This is such-and-such a brand.' That kind of impact will be produced only by an architecture that is new and exciting."

What's New / IN MARKETING

Gasoline retailers in California are pushing hard for legislation to regulate supplier marketing practices, in an attempt to curb price wars.

The California Federation of Service Stations will ask for the legislation next week at hearings in Sacramento.

John A. Touhey, executive secretary of the group, last week blamed the "marketing practices of oil company suppliers" for price wars in the state, and outlined proposed legislation to strengthen fair trade practices laws prohibiting secret rebates.

The hearings next week will be conducted by Assemblyman Thomas J. MacBride, chairman of an Interim Assembly committee named to study the economic situation in the gasoline industry.

Other legislation to be proposed by CFSS would: (1) require grading of gasoline according to quality, to protect the consumer; (2) standardize wholesale gasoline prices within given marketing areas; and (3) require licensing of service station operators, to point up their status as small businessmen.

•

You can expect a "new look" on Speedway Petroleum Corp.'s service stations, trade marks, and packaging. The company plans a complete restyling of all its visual symbols. Sundberg-Ferar, Inc., industrial design firm, has been hired as consultant for the job. Speedway markets gasoline and other products in Michigan, Ohio, Wisconsin, and Canada.

•

Phillips Petroleum Co. is expanding its marketing operations in central Illinois. Last week Baron-Huot Oil Co., of Kankakee, a D-X Sunray jobber for 35 years, signed as a Phillips jobber. The move makes Phillips the largest marketer in the Kankakee area, with 25 stations and accounts. A Phillips spokesman says the company expects to record a 25% to 30% sales increase for the area during the year ahead.

•

Steady growth of the natural gas industry continues, apparently unhampered by the recent slowdown in the over-all economy.

The Bureau of Mines reports that natural gas output in 1957 was 6% higher than in 1956, with Maine and New Hampshire the only nonconsumer states. Broken down by type of consumer, these increases are reported for 1957 by the bureau: residential, up 7%; commercial, up 8%; field use, up 4%; petroleum refineries, no change; other industrial uses, up 7%.

Average wellhead value climbed 0.5¢ per Mcf. Value at point of consumption averaged 1.6¢ higher per Mcf., the bureau says.

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Here's how it works: A "changed" condition at a remote point automatically "dials" a reporting lamp and alarm buzzer at control center and then disconnects—leaving the circuit free for other signals. Control operator then dials a 2-digit number to correct conditions at remote station. The circuit is again released after the corrective function is started.

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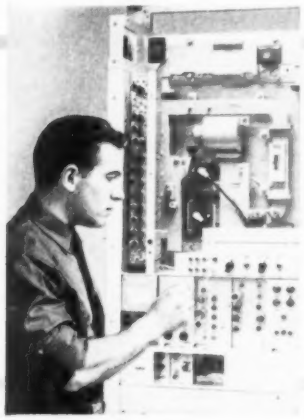

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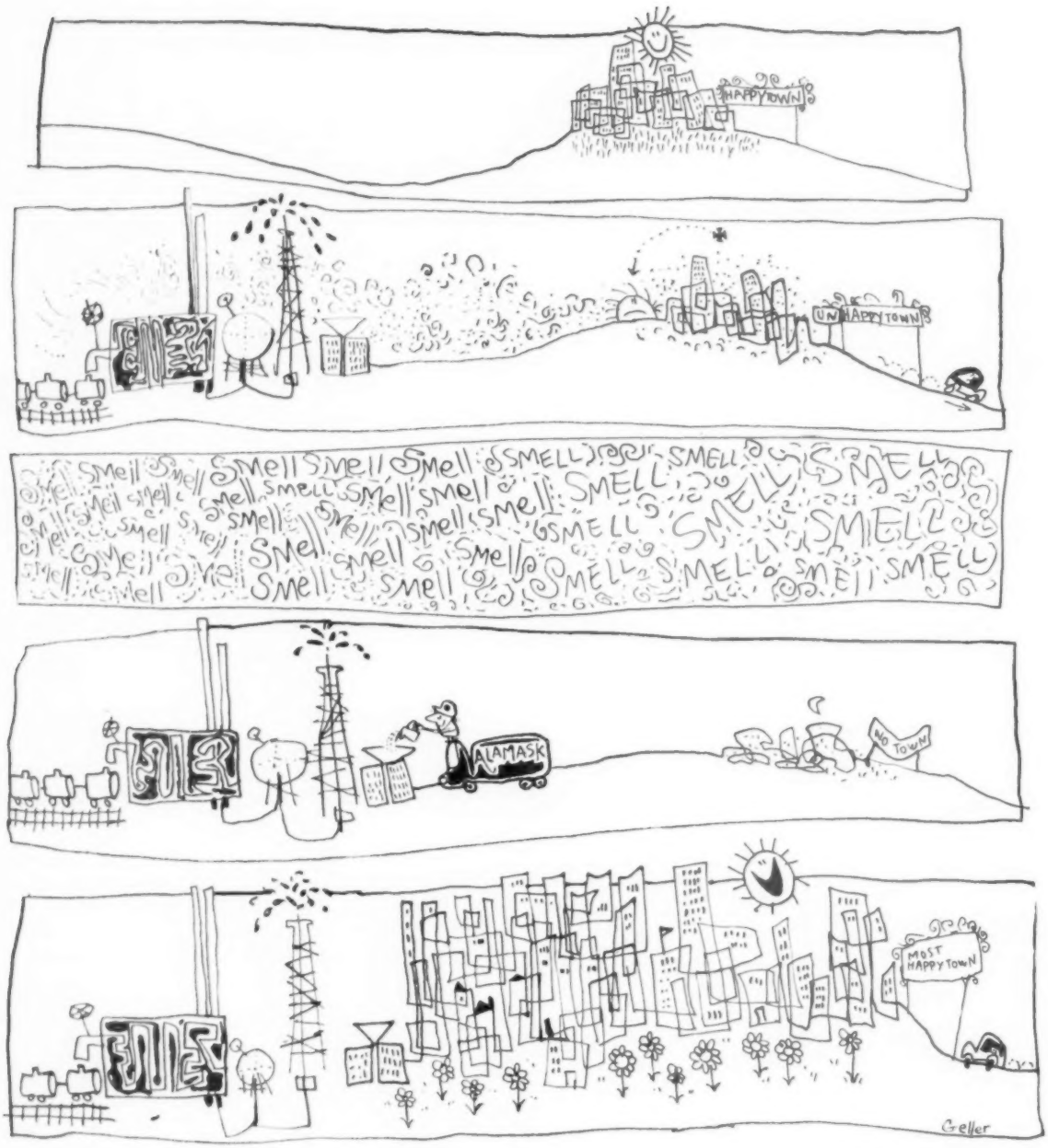

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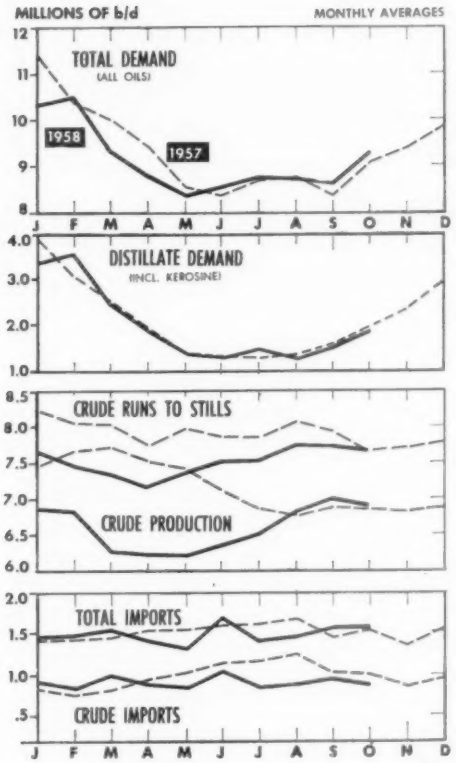
PETROLEUM WEEK'S

Fingertip Figures



Supply-Demand Figures for October

(millions of b/d)

	October 1958	% Change from year ago	10 Months 1958	% Change from year ago
Total Demand (Inc. Exports)	9.277	+ 2.5	9.094	—2.2
Gasoline	4.127	+ 4.8	3.985	+0.5
Distillate (Inc. Kerosine)	1.805	— 7.7	1.963	—2.3
Residual	1.545	+ 4.0	1.465	—7.0
Total Supply	9.284	+ 1.0	8.997	—6.0
Domestic Crude	6.907	+ 0.7	6.617	—8.5
Nat. Gas Liquids	.800	— 0.3	.787	—1.9
Total Domestic	7.707	+ 0.6	7.404	—7.9
Crude Imports	.886	—13.3	.925	—7.9
Total Imports	1.577	+ 2.9	1.593	+3.9

RUNS TO STILLS

Latest week	*
Previous week	7.752
Year ago	7.540

CRUDE PRODUCTION

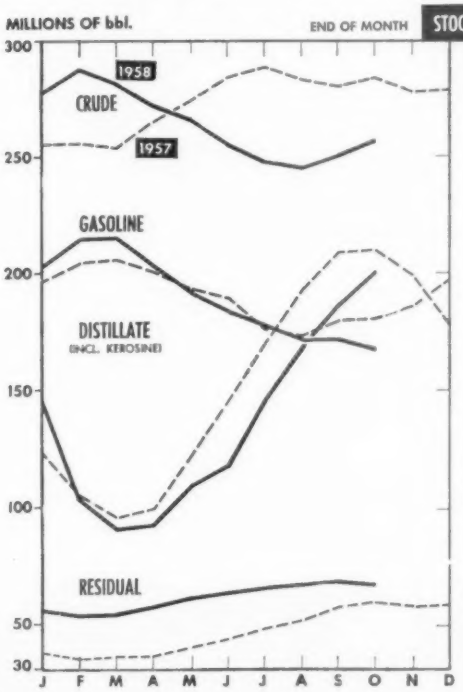
Latest week	*
Previous week	6.911
Year ago	6.796

TOTAL IMPORTS

Latest week	*
Previous week	1.901
Year ago	1.251

CRUDE IMPORTS

Latest week	*
Previous week	.949
Year ago	.776



STOCKS: CRUDE

Week-ended 11-1	255.7
Previous week	255.0
Year ago	283.1

GASOLINE

Latest week	*
Previous week	168.5
Year ago	180.8

DISTILLATES

Latest week	*
Previous week	199.8
Year ago	208.1

RESIDUAL

Latest week	*
Previous week	67.6
Year ago	59.3

Improvements in demand in the waning months of 1958 are bringing over-all demand closer to 1957 volume.

In the first quarter, total demand trailed 1957 by 6%. By the end of the first half, the margin was reduced to 4.7%, and for the first ten months of the year it was further trimmed to 2.2%.

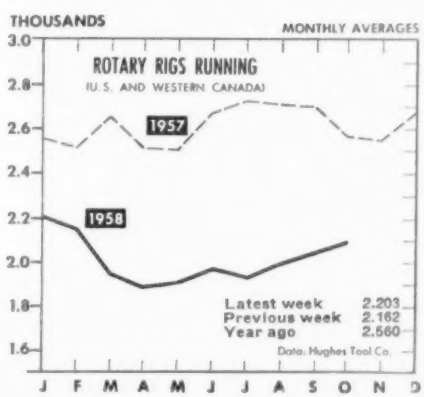
The industry, by keeping new supply—primarily domestic production—under a tight rein, has also brought supply in balance with demand. This correction is now making possible increases in crude output.

October marked the third consecutive month that domestic crude production exceeded the 1957 levels, though total imports have been higher than 1957 in several months.

Demand-wise, gasoline has been the industry's star performer so far this year —a much needed demand.

* * *

*Due to the API meeting, most figures for the week ended Nov. 7 were delayed.



The Market Trend

AT-A-GLANCE PETROLEUM WEEK Copyright

Discounts: Now Everybody's in the Act

Major marketers might do well to give their top men a course in the fine art of giving discounts. The business of giving something off used to be the prerogative of the independents. Today, the majors have a "new look," and more than ever intend not to lose sales. So they're getting into the discount act, too.

Actually, big marketers have to be as fast on their feet with discounts as anybody. Their list prices are too well known. Thus, the only good discount a big marketer can give is a secret discount that stays secret. This, in itself, is quite a feat.

When it comes to discounts, the field is wide open. Secret discounts on the one hand exist side by side with publicly announced "voluntary allowances" on the other. A recent refinement has been to grant special discounts only to customers who ask for them—there apparently being nothing more calculated to unsettle the competition.

Last week's antics in the New York distillate market provide a fascinating study in discounts. Some sellers there gave secret discounts of 0.25¢ a gal. off other sellers' prices. The "other sellers" gave voluntary allowances to meet the secret cuts. Then, when the market looked stronger, the "other sellers" publicly withdrew their "voluntaries," but privately instituted secret discounts. These machinations presumably put everybody in New York on a par. So now the market appears set for that delicate transition—a price advance in which everyone keeps his customers.

Discounts are creeping into markets where they never before existed. The Southeast used to be a "clean" market—but no more. Ship's bunkering, too, was a no-discount market, but today there is a sizeable list of world ports where shadings are possible.

One trouble with discounts is that, though they start in weak markets, they continue right on through strong ones. They become ingrained in the oil economy. Thus, no matter how strong the supplier says the price is, you can bet money somebody somewhere is getting something off.

Reverse English:

The standing joke about discounts concerns the supplier who extended too much credit and got his company in precarious straits. "It's too bad," a friend commiserated, "but think how much worse it would be if you'd charged the full price."

Persian Gulf Resid:

Persian Gulf sellers pretty much still are holding to their postings on heavy fuel oil, but some cheap offerings also are being made. Compared with posted residual prices ranging from $1.90 to $2.00, some lots are being quoted at $1.15.

New York marketers aren't disturbed one way or the other about the f.o.b. price—as long as the landed price is below $1.90.

Mid-River Gasoline:

A hurry-up request for 75,000 bbl. of gasoline at mid-Mississippi River terminals found the area almost bare of offerings. The gasoline was wanted fairly well up the river to beat the freeze in the Upper Midwest. This inquiry probably will be filled in the New Orleans area, but traders now say there are "no bargains there."

The Market Place

AROUND THE WORLD

Prices compiled for PETROLEUM WEEK by Platt's OILGRAM Price Service and National Petroleum News, McGraw-Hill Publications

All prices as of November 6

Bold face type indicates changes from previous week

KEY PRICES—REFINED PRODUCTS

(¢ per gal. except dollars per bbl. where $ is shown)

Western Hemisphere

U.S. Gulf Coast, cargoes
- Gasoline, 98 oct prem. . . . 11.75-12.75
- Gasoline, 92 oct reg. . . . 10.5-11.5
- Kerosine . . . 9.125
- Heating oil, No. 2. . . . 8.625-9
- Gas oil, 48-52 d.i. . . . 8.875-9.5
- Fuel oil, bunker "C" . . . $2.00-2.10

Caribbean, cargoes
- Avgas, Grade 100/130 . . . 16
- Gasoline, 93 oct research prem. . . . 10.75
- Gasoline, 87 oct research reg. . . . 9.875
- Gasoline, 79 oct research. . . . 9.125
- Gasoline, 70-72 oct motor method. . . . 9
- Kerosine . . . 9.375
- Heating oil, No. 2. . . . 8.625
- Gas oil, 48-52 d.i. . . . 8.875
- Fuel oil, bunker "C" . . . $2.00

New York Harbor, barges
- Kerosine . . . 10.2
- Heating oil, No. 2. . . . 9.7
- Fuel oil, No. 6. . . . $2.37-2.45

Okla-Group 3, northern shpt., bulk
- Gasoline, 89 oct reg. . . . 11.625-12.375
- Kerosine . . . 10-10.5
- Heating oil, No. 2. . . . 9-9.5
- Fuel oil, No. 6. . . . $1.50

Chicago, bulk
- Gasoline, 91 oct reg. . . . 11.25
- Heating oil, No. 2. . . . 9.5-11.35
- Fuel oil, No. 6 high sulfur. . . . 6.9-7

Los Angeles, rack
- Gasoline, 88 oct reg. . . . 12.25-13.6
- Diesel fuel, PS 200. . . . 10-11.25
- Light fuel, PS 300. . . . $2.80
- Heavy fuel, PS 400. . . . $2.15-2.35

Natural Gasoline, Grade 26-70
- FOB Group 3. . . . 4.5
- FOB Breckenridge, Tex. . . . 4

LP-Gas
- Propane, Oklahoma (Group 3). . . . 5

Pennsylvania Lubes
- Bright stock, 25 p.t. . . . 22
- 200 vis. neutral, 25 p.t. . . . 21

Mid-Continent Lubes, Tulsa basis
- Bright stock, solvent, 95 v.i. . . . 23-24
- Neutral, solvent, 200-210 vis. . . . 19.5-20.5

Gulf Coast Lubes
- Bright stock, solvent, 95 v. i. . . . 24
- Neutral, solvent, 200 vis. . . . 20.5

Eastern Hemisphere

Singapore (Pulau Bukom), cargoes
- Avgas, grade 100/130. . . . 17.25
- Gasoline, 79 oct research. . . . 10.375
- Kerosine . . . 10.375
- Gas oil, 48 d. i. minimum. . . . 10.25

KEY PRICES—CRUDE OIL

(2¢ differential per deg. of grav. applies except as noted)

Western Hemisphere

United States (at the well)
- **Mid-Continent, 36.0-36.9. . . . 2.73‡-3.07**
- North Dakota, 36.0-36.9. . . . 2.62-3.07
- Texas:
  - Gulf Coast, low cold test, 26.0-26.9. . . . 3.50
  - Gulf Coast, Upper & Lower, 26.0-26.9. . . . 2.92-3.22
  - West Texas, sweet, 36.0-36.9. . . . 3.00-3.07
  - West Texas, N. M., inter., 36.0-36.9. . . . 3.00
  - West Texas, N. M., sour, 32.0-32.9. . . . 2.86
  - East Texas, flat. . . . 3.25
  - Mirando, 28.0-28.9. . . . 3.31
- Illinois Basin, flat. . . . 3.00
- Pennsylvania Grade, Bradford dist., flat. . . . 3.90
- California, Signal Hill, 21.0-21.9. . . . 2.50‡
- **North Louisiana-Arkansas, 36.0-36.9. . . . 2.77‡-3.02**
- Wyoming, sweet, 36.0-36.9. . . . 2.90-3.00
- Wyoming, sour, 32.0-32.9. . . . 2.71

Canada (flat prices, at the well)
- Acheson-Stony Plain (Alta.). . . . 2.61
- Leduc-Woodbend (Alta.). . . . 2.67
- Redwater (Alta.). . . . 2.56
- Daly (Man.). . . . 2.39
- Smiley (Sask.). . . . 2.33

Venezuela (Cargoes, FOB lifting port designated)
- Cumarebo, 48.0-48.9, Tucupido. . . . 3.75
- **San Joaquin, 41.0-41.9, Puerto la Cruz. . . . 3.25‡-3.34**
- Oficina, 35.0-35.9, Puerto la Cruz. . . . 3.05
- Tia Juana, Medium, 26.0-26.9, Amuay. . . . 2.55
- Bachaquero, flat, Las Piedras. . . . 1.78-1.93
- Tarra, 38.0-38.9, San Lorenzo. . . . 3.08
- Lagunillas Heavy, flat, Cardon. . . . 2.10

‡*Differential per deg. of grav. varies.*

Eastern Hemisphere

Middle East, Persian Gulf (Cargoes, FOB lifting port)
- Arabia, 34.0-34.9, Ras Tanura. . . . 2.08
- Safaniya, 27.0-27.9, Ras Tanura. . . . 1.65
- Iran, 34.0-34.9, Bandar Mashur. . . . 2.04
- Iran, 34.0-34.9, Abadan. . . . 1.99
- Iraq, 35.0-35.9, Fao. . . . 1.98
- Kuwait, 31.0-31.9, Mina-al-Ahmadi. . . . 1.85
- Qatar, 41.0-41.9, Umm Said. . . . 2.23
- Neutral Zone, Burgham, 23.5-24.4, Mina Saud. . . . 1.61
- N. Zone, Eocene-Ratawi, 20.5-21.4, Mina Saud. . . . 1.43

Middle East, Eastern Mediterranean
- Arabian, 36.0-36.9, Sidon. . . . 2.49
- Iraqi, 36.0-36.9, Tripoli, Banias. . . . 2.49

Far East, Cargoes, FOB Lutong, Sarawak
- Seria Light, 37-38. . . . 2.75

KEY TANKER RATES

(Last paid, per long ton, single voyage)

- **U.S. Gulf-N. Y., clean. . . . (USMC —17½%) $2.35‡**
- U.S. Gulf-New York, dirty. . . . (USMC —10%) $2.57
- **NWI-USNH, dirty. . . . (USMC —62½%) $1.01‡**
- NWI-UK/Cont., dirty. . . . (Scale —50%) 16/3*
- Persian Gulf-UK/Cont., dirty. . . . (Scale —50%) 30/10*
- Persian Gulf-USNH, dirty. . . . (USMC —60%) $5.08

**Sterling.*

DEPT/Personals

J. E. Wood III

A. D. Green

K. J. Nelson

H. J. Rose

JOHN E. WOOD III has become president of Enjay Co., New York, petrochemicals marketing subsidiary of Standard Oil Co. (N.J.). Three new Enjay vice-presidents are **Karl J. Nelson, Harold J. Rose,** and **A. Donald Green.** Wood was formerly general manager of the chemical products department of Esso Standard Oil Co., New York. He succeeds **O. V. Tracy,** vice-president and a director of Esso, who will devote full time to his duties as head of Esso's manufacturing activities. Nelson, with Enjay since 1939, has been head of the company's sales department since July. Rose has been head of Enjay's products management department, and Green head of the new projects department. The three men will continue to head their present departments.

H. S. M. BURNS, president of Shell Oil Co. and chairman of the board of the American Petroleum Institute, has accepted the presidency of next year's meeting of the World Petroleum Congress. The meeting is scheduled for May 30 to June 5, in New York.

SPECIAL HONORS were conferred on 52 oil men at the American Petroleum Institute's annual meeting in Chicago this week. Recipients of the citations given by API's production division are: **R. B. Anderson,** Columbia Carbon Co., Charleston, W. Va.; **Milan G. Arthur,** Union Oil Co. of California, Los Angeles; **H. F. Beardmore,** Warren Petroleum Corp., Houston; **S. E. Buckley,** Humble Oil & Refining Co., Houston; **J. O. Hills,** General Petroleum Corp., Los Angeles; **H. S. Kelly,** Phillips Petroleum Co., Bartlesville, Okla.; **George B. Kitchel,** Kerr-McGee Oil Industries, Inc., Houston; **H. W. Perkins,** Sun Oil Co., Beaumont, Tex.; and **F. H. Willibrand,** Sohio Petroleum Co., Oklahoma City. The 11 recipients in API's transportation division are: **William G. Anderson,** Atlantic Refining Co., Philadelphia; **A. D. Carleton,** Standard Oil Co. of California, San Francisco; **R. L. Carruthers** (retired), Shell Pipe Line Co., Houston; **M. S. Coilett,** Atlantic Refining Co., Philadelphia; **Fred Hague,** Sun Oil Co., Philadelphia; **E. L. Hoffman,** Socony Mobil Oil Co., New York; **E. W. Jacobsen,** Gulf Research & Development Corp., Pittsburgh; **A. E. Kihn,** California Shipping Co., San Francisco; **Frank O. Prior,** Standard Oil Co. (Ind.), Chicago; **R. G. Strong** (retired), Natural Gas Pipeline Co. of America, Chicago; and **C. H. Wager,** Shell Oil Co., New York. The three recipients in the division of marketing are: **P. W. Engels,** Shell Oil Co., New York, **Samuel Rossenwasser,** S.R. Service Stations, Brooklyn, N.Y., and **Nelson H. Seubert,** Standard Oil Co. (N.J.), New York. Three who received awards from API's fundamental research committee are: **Lloyd E. Elkins,** Pan American Petroleum Corp., Tulsa; **Theodore W. Nelson,** Socony Mobil Oil Co., New York; and **W. D. Seyfried,** Humble Oil & Refining Co., Baytown, Tex. **Dr. Robert Eckardt,** Esso Research & Engineering Co., Linden, N.J., is the recipient of the award from API's medical advisory committee, and **Ralph A. Martin,** Standard Oil Co. (Ohio), Cleveland, from the Division of Finance & Accounting. Nine awards from the American Petroleum Industries Committee were given to: **Oscar John Dorwin,** The Texas Co., New York; **Rayburn L. Foster,** Phillips Petroleum Co., Bartlesville, Okla.; **Archie D Gray,** Gulf Oil Corp., Pittsburgh; **Charles Z. Hardwick,** Ohio Oil Co., Findlay; **J. G. Jordan,** Shell Oil Co., New York; **William A. McAfee,** Standard Oil Co. (Ohio), Cleveland; **R. L. Milligan,** Pure Oil Co., Chicago; **Henry O'Brien,** Cities Service Co., New York; and **Merrill H. Utley,** Standard Oil Co. (Ky.), Louisville. The 15 who received awards from the oil information committee are: **W. A. Alexander,** Shell Oil Co., Denver; **W. A. Bourne,** Gulf Oil Corp., Toledo; **Charles R. Brown,** Tidewater Oil Co., Tulsa; **Fayette B. Dow,** National Petroleum Assn., Washington, D.C.; **Richard D. Drysdale,** Sun Oil Co., Boston; **W. M.**

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JOHN C. HORNING, manager of operations of Leonard Crude Oil Co., Mt. Pleasant, Mich., has been elected vice-president of that company. Horning, also a company director, assumed his new post on Oct 20.

J. C. Horning

H. L. Moir

HARRY L. MOIR has been elected vice-president for retail marketing of Pure Oil Co., Chicago. At the same time, **Allen C. Hutcheson** was elected vice-president and secretary, and **Raynor F. Sturgis, Jr.,** vice-president and treasurer. Moir, formerly assistant vice-president for retail marketing, succeeds **Lisle W. Sweet,** who has been given the increased responsibility of vice-president for marketing. Hutcheson joined Pure in 1953 as secretary. Before that, he was associated with Vinson, Elkins, Weems & Searls, Houston, general counsel for Pure, and was assigned full-time to Pure's various producing divisions. Sturgis joined Pure in 1951 as executive assistant to the treasurer, and was elected treasurer in 1953.

J. L. HOELSCHER has been named senior engineer on the refining engineering manager's staff of Ohio Oil Co., at the general offices in Findlay, Ohio. He was formerly maintenance superintendent at Ohio's Robinson (Ill.) refinery.

WILLIAM B. FENWICK is Philadelphia division manager for American Oil Co. He has been with Amoco since 1946, and has served as assistant Philadelphia manager since 1954. **J. Howard Corry** has been appointed manager of the heavy fuel oil department, in New York. He was appointed assistant manager of that department in 1957.

WILBUR B. SHERMAN has become president of Pan American Land & Oil Royalty Co., Dallas. Sherman was formerly vice-president and a director of DeGolyer & MacNaughton, Inc., also in Dallas, in which capacity he served as a consultant for Pan American. Before that, he was headquartered in Brazil as senior representative for DeGolyer & MacNaughton, while it was technical advisor for petroleum for the Brazilian government.

R. C. ADAM will move to Dallas on Jan. 1, in a newly created executive position in charge of economics for Magnolia Petroleum Co. His new duties will involve studies of economic conditions affecting all phases of the company's operations. Adam is Magnolia's manager of operations at the company's Beaumont refinery.

R. C. Adam

J. A. Keepers

JOE A. KEEPERS has been named to the new post of manager of petrochemical sales for Lion Oil Co., with offices in Houston. Keepers was formerly senior project specialist in Lion's development department, at New Orleans. At the same time, **N. Patrick Hudson** was named assistant sales manager of protective coatings, in El Dorado, Ark. Hudson, with Lion since 1949, was most recently administrative assistant to the manager of protective coatings sales.

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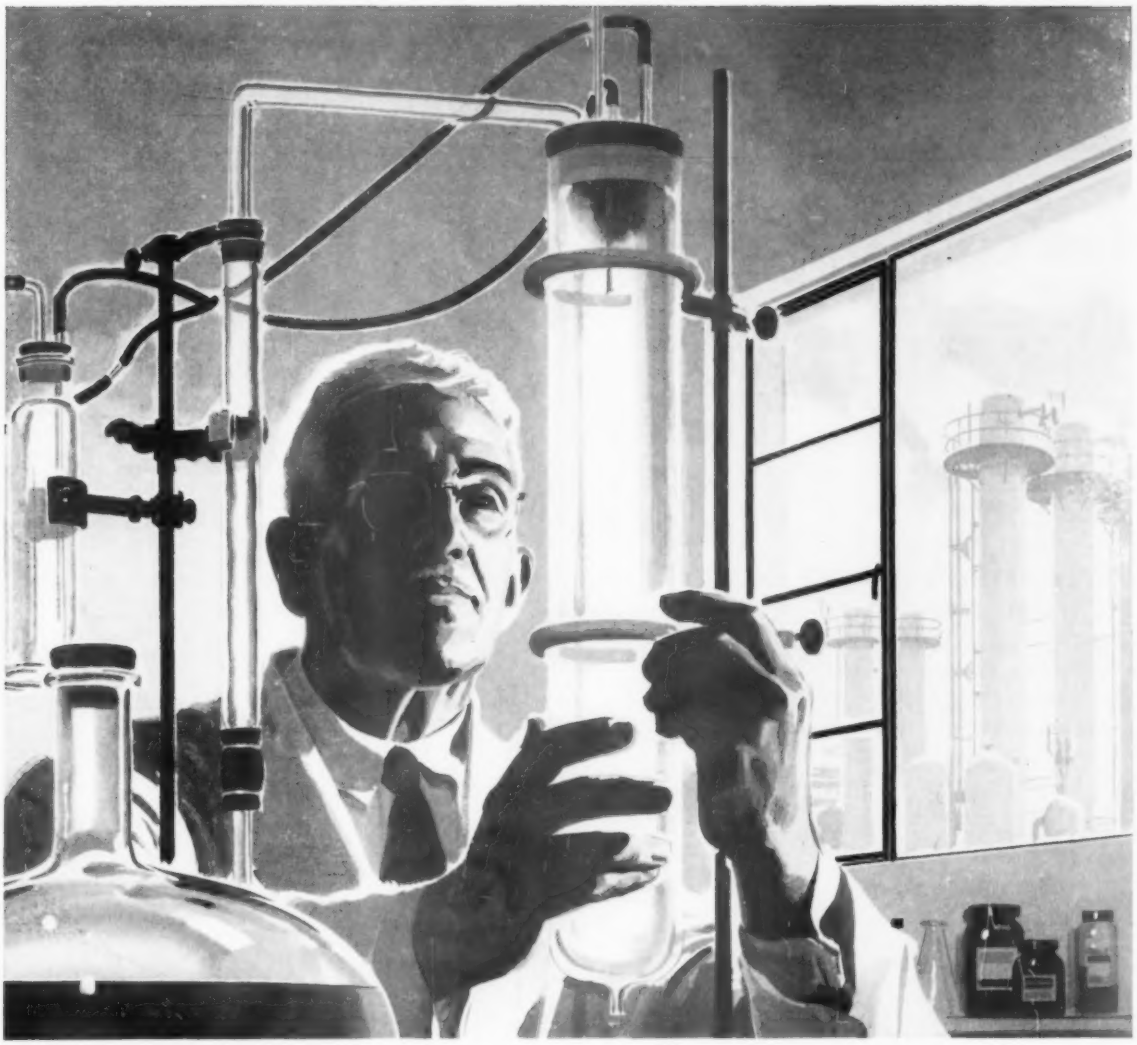

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DEPT/Service & Equipment Companies

GORDON R. HENDERSON has been elected president and a director of Catalytic Construction of Canada, Ltd., with headquarters in Sarnia, Ontario. Henderson directed Catalytic of Canada through its first job, which was the engineering, procurement, and construction of a refinery for Sun Oil Co., Ltd., in Sarnia. In 1953, Henderson became general manager of that refinery, a position he has held up to the present time.

G. R. Henderson

T. G. Gillespie, Jr.

THOMAS G. GILLESPIE, JR., has been appointed vice-president of Scientific Design Co., New York, in charge of legal and contract matters, as well as other development activities. Gillespie, with SD since 1955, has previously been associated with the patent departments of Koppers Co. and Sharp & Dohme. SD engineers and builds organic and petrochemical plants in the United States and abroad.

ALAN C. ROBERTS has been appointed manager of the newly created oil and gas section of the Fort Worth National Bank's trust department. Roberts has been with Cities Service Oil Co. since 1951, and has spent the last two years as special representative for property acquisition in its Fort Worth land department. Before that, he was Cities Service's manager of crude oil purchases and sales, in Midland.

WILLIAM C. HOOKWAY is director of product engineering in the new consolidated product engineering department of Cooper Alloy Corp., Hillside, N.J. Hookway will coordinate the efforts of all design development personnel in Cooper Alloy's valve and fitting, foundry products, and Vanton pump divisions. Hookway, with Cooper Alloy since 1949, has been manager of product engineering for the stainless steel valve and fitting division since 1952.

J. L. FELTS, eastern district manager of B&W, Inc., manufacturer of primary cementing tools for the oil industry, is head of the company's new warehouse and service center in Morgan City, La. The new warehouse will provide delivery and installation of B&W products to customers located in south-central Louisiana.

L. B. SWAN has been appointed vice-president of the Dowell Division of Dow Chemical Co., with headquarters in Houston. Swan, also a Dowell director, will be responsible for Dowell's foreign operations, including work in Argentina, and for the operations of United Oilwell Service, a Dow subsidiary operating in Venezuela. Swan, formerly general manager of Dow's Brazos Oil & Gas Division, in Houston, is succeeded by **R. A. Beutel,** who was Brazos' district geologist in Michigan, Tex., and in Louisiana. **Tromer R. Smith,** United Oilwell general manager in Venezuela, will move to Houston early next year to supervise Dowell's Latin American activities. **Basil A. Hodges,** United Oil well operations manager, will replace Smith in Venezuela.

GRANT C. BUTLER has been appointed director of public relations for Associated Piping & Engineering Co., Los Angeles and Gulfport, Miss. Butler has headed field public relations of Arabian American Oil Co., in Saudi Arabia, and more recently was manager of group relations for Richfield Oil Corp., in Los Angeles. Butler has also been the recipient of awards for contributing to better understanding between America and the Middle East countries, through his articles and lectures in the Arab world.

HAROLD E. PARSONS has been named to the position of assistant Oklahoma City division manager of Western Co., after completion of a special nine-month industrial management course at the Harvard Graduate School of Business, Cambridge, Mass. Parsons has been divisional operations manager in Oklahoma City since 1957. In his new position with Western, Parsons will assist **C. E. Wooldridge,** Oklahoma City division manager, in the administration of Western's service area, including districts in Oklahoma, Kansas, the Texas Panhandle, and the Four Corners area.

L. J. Prior

W. T. Hoffman

LOUIS J. PRIOR has been named traffic manager in the machinery division, and **WILLIAM T. HOFFMAN** traffic manager in the tubular division, of National Supply Co., in Pittsburgh. The two men divide the responsibilities held by **John N. Lind,** formerly general traffic manager, who has become director of transportation for Armco Steel Corp., National Supply's parent company. Prior, has been assistant general traffic manager in Pittsburgh since 1952. Hoffman was formerly superintendent of material handling at the Ambridge (Pa.) plant of the Spang-Chalfant Division.

OIL FOR TO-DAY AND TO-MORROW

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How Ridiculous Can You Get?

ADJUSTMENTS—DOWNWARD—in crude oil prices, particularly in Oklahoma, have been carried to the point of ridiculousness.

Every company apparently has come up with its own formula for adjusting crude prices to the proper realization value for the refiner. As a result, there is no semblance of equity among the various prices posted, nor is there any agreement as to the proper differential for each degree of gravity. These vary almost as much as the top posted price.

THERE IS NO DOUBT but what the purchasing companies gave much thought to their new price schedules before putting them into effect. But what they overlooked was the producer. He is the victim of the hodge-podge posting system now in effect in Oklahoma, particularly where there is more than one purchaser in a field.

Here is where the inequities begin to appear. It's a little difficult to see how the same crude from the same field could have such a wide range of values to various refiners. Of course values differ by refineries —but not to the extent of this ridiculous posting system, particularly as to the wide range of values placed on the gravity of the crude.

And the producer ofttimes suffers twice from this grab bag price system. This is particularly true on tribal lands, where compensatory royalty is compulsory. In other words, the producer must pay royalty on the tribal lands based on the highest posted price in the field. If he is receiving less than the highest price, he not only suffers from the lower posting, but must make up the difference in royalty payments. He takes less for his crude, and then has to reach into his pocket to pay the tribal funds, which, in effect, is another price cut.

GETTING AWAY FROM the Oklahoma situation and looking at the picture as a whole, what makes the whole thing even more ridiculous is that most of the causes for the price cuts can be attributed to those utilizing the crude.

Crude stocks, in late summer, were down to such a low level that some of the larger integrated companies actually were not receiving enough to supply their needs, and they were in the market for products to offset this deficiency. But before the drying-up process could be carried to its conclusion, they pushed for and received allowable increases in some of the proration states.

And that is what weakens their position and makes the adjustments even more ridiculous. It is a little difficult for the producer to understand how a company can go into Texas and ask for an allowable increase, and then cut prices.

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Services for the oil industry

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A SERVICE DIVISION OF THE DOW CHEMICAL COMPANY

Unique Teamwork

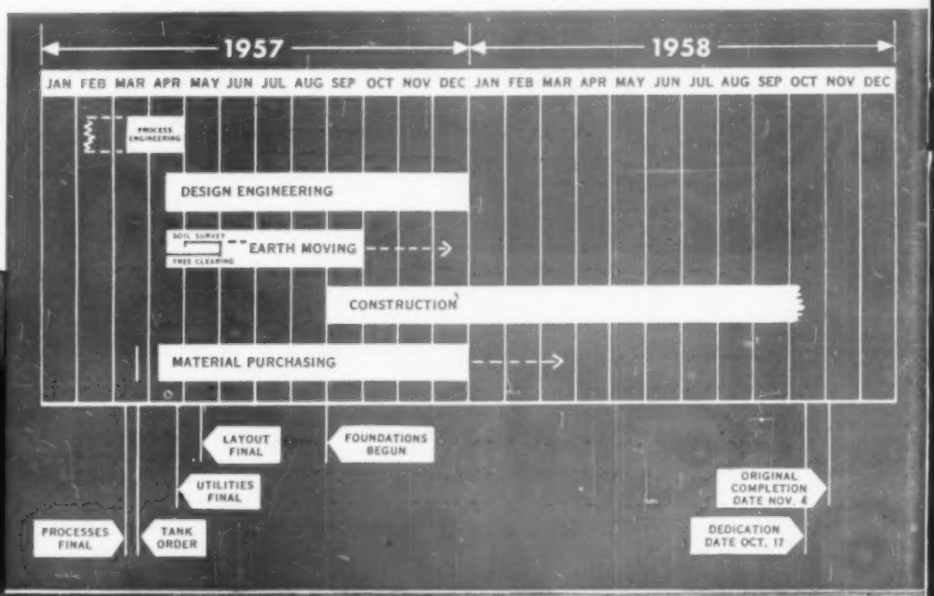
Speeds Completion of B/A's Port Moody Refinery

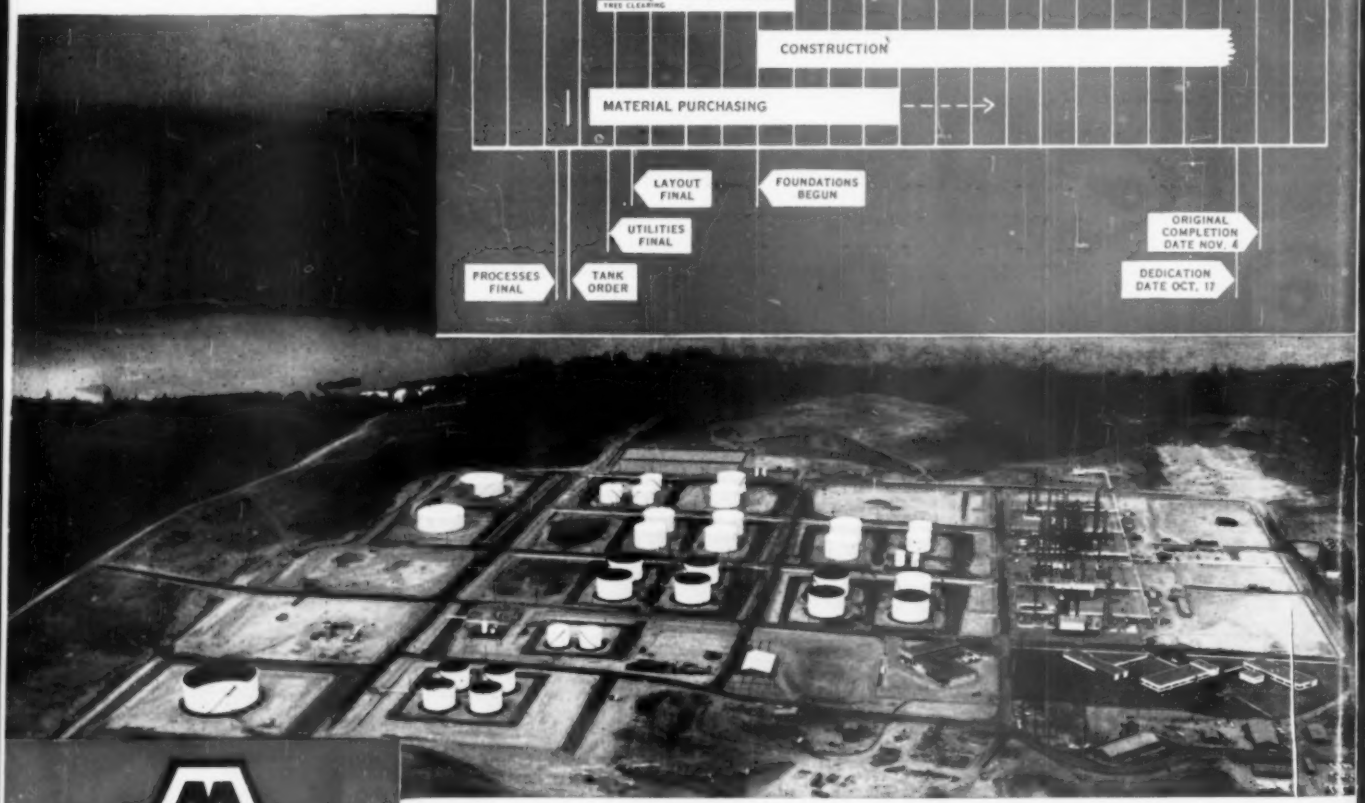
Foreseeing unusually rapid changes in the West Coast marketing situation, the British American Oil Company in the Spring of 1957 decided a new "grass roots" refinery was required in the Vancouver area by the Winter of 1958. Eighteen months or so is a short time to plan and execute a refinery project. Canadian Kellogg's accomplishment of this unusual speed record is a testimony to the B/A organization and its ability to delegate decision-making. Working with a special team of B/A engineers who could make decisions "on the site", Kellogg completed the project ahead of schedule.

One of the first things Canadian Kellogg required were horses—the only transportation the engineers could use to negotiate the muddy conditions on the site. But a strategically placed drainage and pumping system soon dried the ground and proved so effective that after its installation not one day's labor was lost through wet conditions. Other practical solutions to construction problems, plus the most advanced chemical engineering, have made the investment per barrel capacity of the B/A Port Moody refinery relatively very low.

Right from the start Canadian Kellogg's experience and B/A's cooperation pushed the job ahead of schedule. Of course, B/A and Canadian Kellogg have worked together before. The Port Moody contract was awarded to Canadian Kellogg mainly on past performance . . . this move in itself saved the time and money normally spent preparing and analyzing detail bids. Mutual respect between client and contractor was one of the outstanding factors that contributed to the speedy completion of the project.

Right: *Chart shows rapid construction progress made on the Port Moody project.* **Below:** *Air view of new B/A Port Moody refinery, Vancouver, British Columbia. Process section, right, is subdivided into five areas: (1) Crude Unit, (2) Catalytic Reformer and Distillate Desulfurization Unit, (3) Utility Plant, (4) Orthoflow® Fluid Cat Cracker, and (5) Alkylation Unit.*





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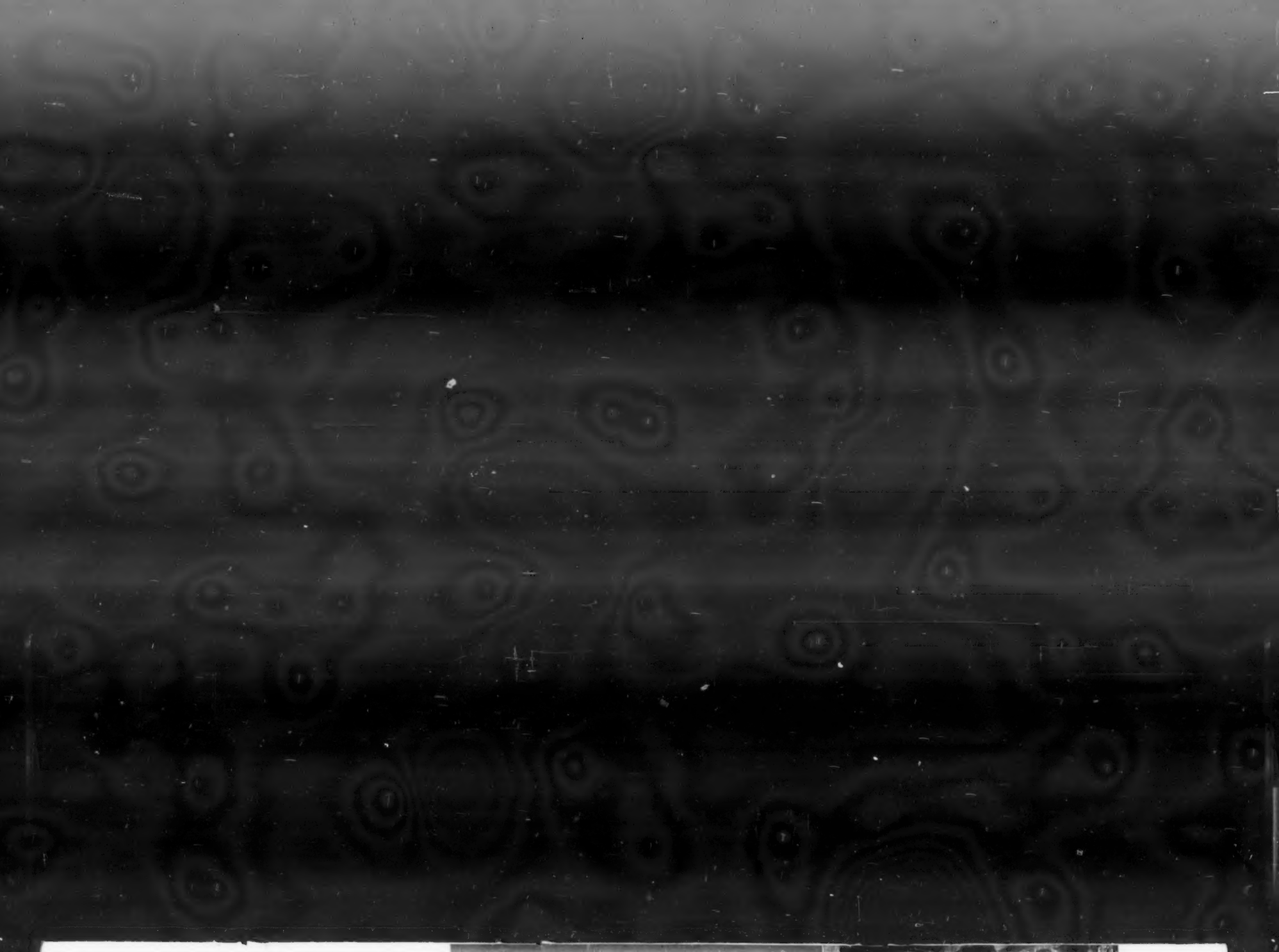
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